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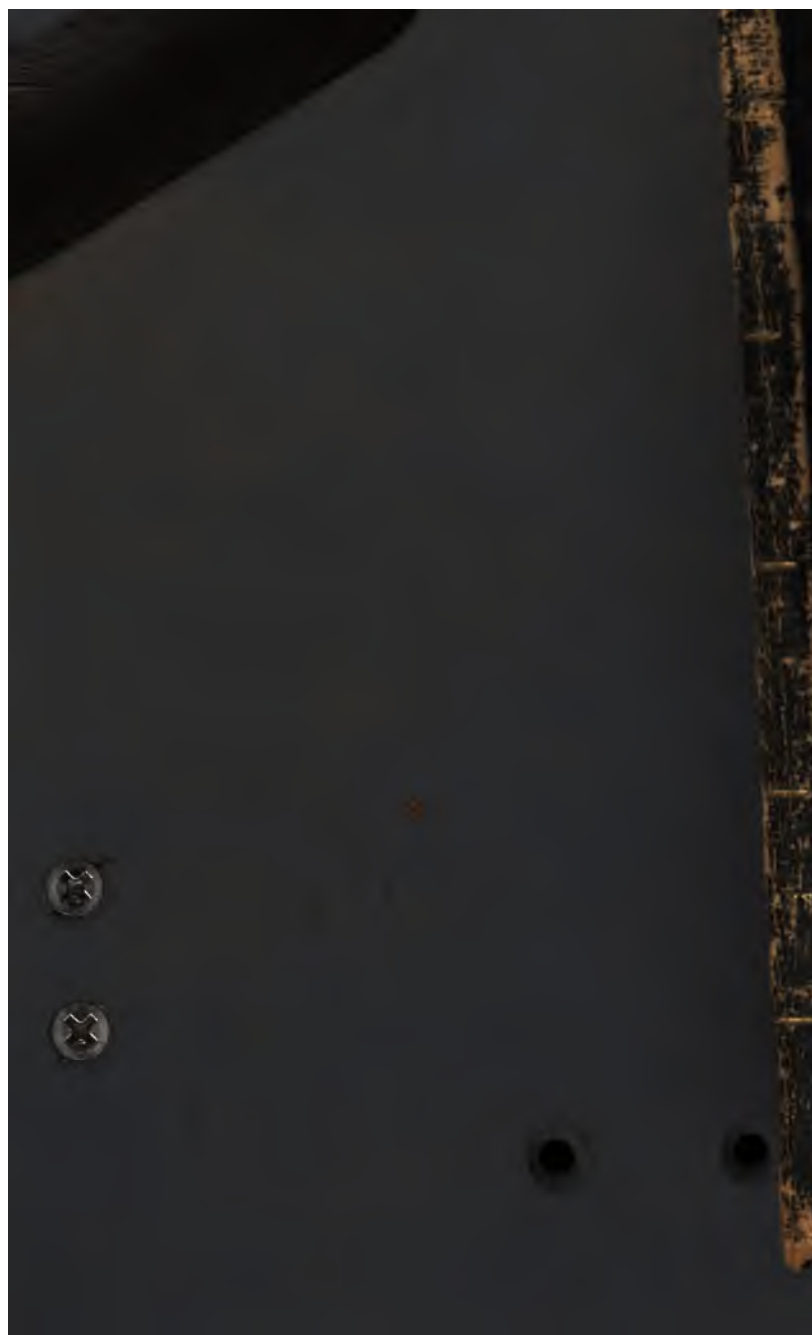
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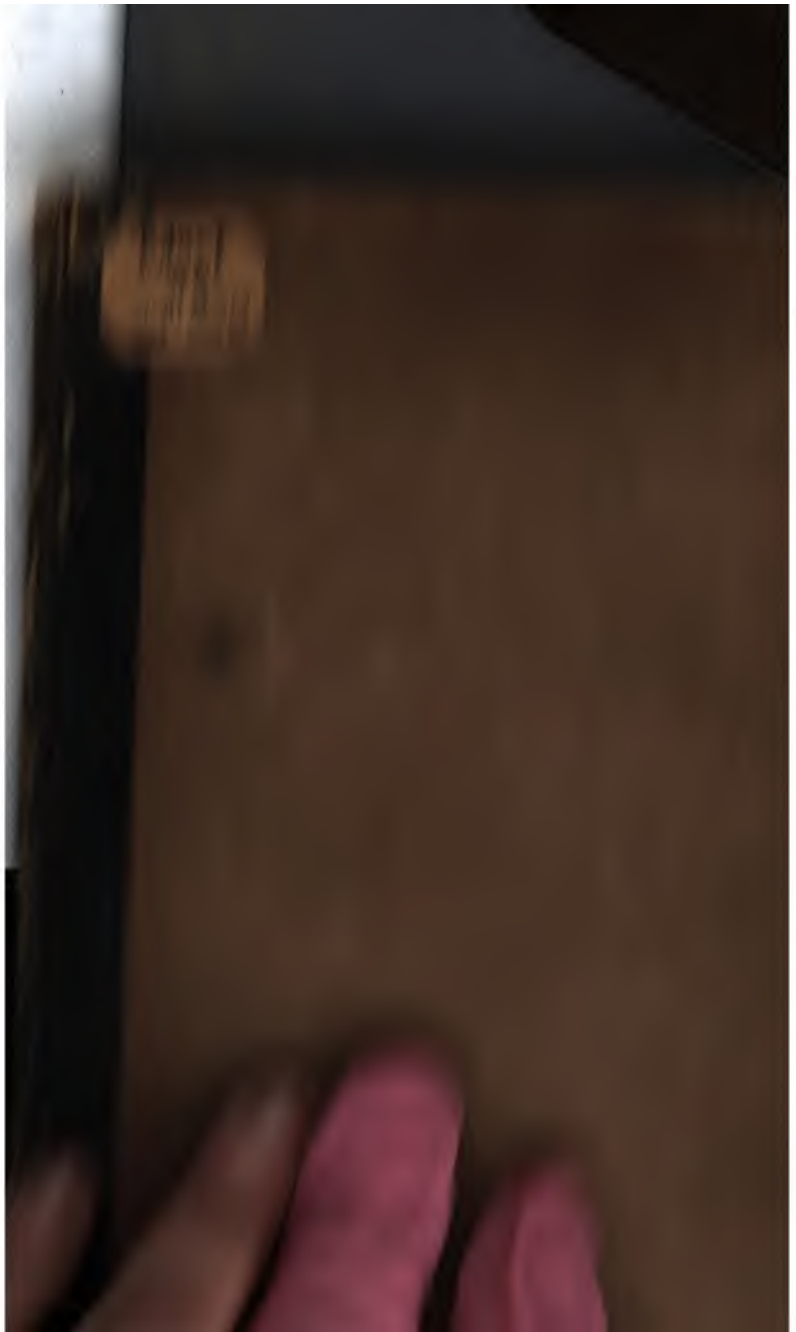
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FROM

*Tufts College*



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Jane Sumner

March 7th 1835





**KEY,**  
**CONTAINING**  
**ANSWERS TO THE EXAMPLES**  
**IN THE**  
**SEQUEL TO**  
**INTELLECTUAL ARITHMETIC.**

—∞—  
**BY WARREN COLBURN, A. M.**  
—∞—



**BOSTON:**  
**PUBLISHED BY HILLIARD, GRAY & CO.**  
**1834.**

*Scrim*

Edwct 118.34.295



Tufts College

**DISTRICT OF MASSACHUSETTS, TO WIT:**

*District Clerk's Office.*

BE IT REMEMBERED, That on the eleventh day of May, A. D. 1827, in the fifty-first year of the Independence of the United States of America, HILLIARD, GRAY, LITTLE, AND WILKINS, of the said district, have deposited in this office the title of a book, the right whereof they claim as proprietors, in the words following, *to wit*:

"A Key, containing Answers to the Examples in the Sequel to Intellectual Arithmetic. By WARREN COLBURN, A. M."

In conformity to the act of the Congress of the United States, entitled, "An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned:" and also to an act, entitled, "An Act supplementary to an act, entitled, An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned; and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

JNO. W. DAVIS,  
*Clerk of the District of Massachusetts.*

## ADVERTISEMENT.

**THE Key** contains the answers to all the examples in the **Sequel**; and occasional remarks, showing how to solve the questions, and how to use the book. Of course it is intended only for the use of instructors, and of those who wish to teach themselves. Great care will be taken to prevent improper persons from obtaining it. Those who wish for it must make personal application to the publisher.



EducT

118

34.295

26. Fifty thousand, seven hundred and five.
27. Sixty seven thousand, and eighty three.
28. Three hundred thousand, and fifty.
29. Four hundred and seventy six thousand, and eighty nine.
30. Seven hundred and seven thousand, seven hundred and twenty.
31. One million, three hundred and seventy.
32. Five millions, six hundred thousand, and seventy three.
33. Eight millions, eighty one thousand, three hundred and five.
34. Fifty nine millions, six thousand, three hundred and forty one.
35. Three hundred and five millions, eight hundred and seventy thousand, four hundred.
36. Five hundred and ninety millions, forty seven thousand, six hundred and eight.
37. One billion.
38. Three billions, six hundred and seventy millions, three hundred and eighty seven.
39. Forty five billions, seven millions, seventy thousand and seven.
40. Six hundred and eighty billions, nine hundred and thirty millions, one hundred thousand, seven hundred.
41. Fifty trillions, seven hundred and eighty seven billions, six hundred and fifty seven millions, five hundred.
42. Two hundred and seventy trillions, eight hundred and thirty eight millions, three thousand, nine hundred and eight.
43. Sixty eight millions, nine hundred and seven thousand, six hundred and five.
44. Fifty six billions, thirty four thousand, seven hundred and fifty.
45. Six trillions, seven hundred and three billions, seven hundred and twenty millions, eight hundred and fifty seven.



3 2044 096 993 282

*Jane Sumner*

*March 7<sup>th</sup> 1835*



2503

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*Jane Sumner*

*March 7<sup>th</sup> 1835*



**KEY,**  
**CONTAINING**  
**ANSWERS TO THE EXAMPLES**  
**IN THE**  
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**INTELLECTUAL ARITHMETIC.**

——  
**BY WARREN COLBURN, A. M.**  
——



**BOSTON:**  
**PUBLISHED BY HILLIARD, GRAY & CO.**  
**1834.**

*Scrim*







80.	243 dolls. and 2s. over		
81.	80 guineas		
82.	124 dollars		
83.	72d.		
84.	5 dolls. and 1s. 10d. over		
85.	108 dolls. and 4d. over		
86.	17 E. Flem. 1 qr.		
87.	2 E. Eng. 1 qr.		
88.	10 aunes 1 qr.		
89.	91 yds. 1 qr.		
90.	In a little more than 26 days		
91.	£9 2s. 6d.		
92.	50 spoons and 8 dwt. over		
93.	3lb. 3 oz.		
94.	27 coats		
95.	168 bottles		
96.	144 of each kind		
97.	7 of each sort		
98.	15 of each sort		
99.	23 bushels of each sort.		
100.	- 36 of each sort	114.	- - 5337 times
101.	- - 2840 boxes		The dividend in this ex-
102.	- - 329 qqis.		ample should have been
103.	- - 24 barrels		80,055
104.	- - 30 bushels	115.	- - 731 times
105.	- - 348 lb.	116.	- - 52 times
106.	- - 7yds.	117.	- - 37 times
107.	- - 856 times	118.	- - 33 times
108.	- - 4291 times	119.	- - 94 times
109.	- - 9604 times	120.	- - 38 times
110.	- - 290 times	121.	- - 75 times
111.	- - 3669 times	122.	- - 29 times
112.	- 16,212 times	123.	- - 365 times
113.	- 11,807 times	124.	- - 626 times



125.	-	-	9405 times	127.	-	134,092 times
126.	-	-	7638 times	128.	-	1,008,245 times

*Miscellaneous Examples.*

1.	-	-	12s. 9d.	26.	-	-	2 lb. 9 oz.
2.	-	-	9s.	27.	-	-	1 T. 18 cwt.
3.	-	-	10s. 6d.	28.	-	-	£13 11s. 4d.
4.	-	-	£1 4s. 9d.	29.	-	51 gals. 1 qt. 1 pt.	
5.	-	-	£2 13s.	30.	-	83 yds. 3 qrs. 1 nl.	
6.	-	-	£7 6s. 8d.	31.		47 bu. 3 pks. 4 qts.	
7.	-	-	£20 10s.	32.	-	-	£7 17s. 8d.
8.	-	-	£21	33.		17 cwt. 3 qrs. 25 lb.	
9.	-	1 qr. 15 lb. 5. oz.		34.	-	15 yds. 2 qrs.	
10.	-	-	£24 3s.	35.	-	-	45 gals. 1 qt.
11.	-	-	£10 8s. 4d.	36.	-	-	2s. 3d.
12.		7 cwt. 3 qrs. 11 lb.		37.	-	-	£9 1s.
13.		14 cwt. 3 qrs. 13 lb.		38.	-	-	7 yds. 3 qrs.
14.		19 cwt. 3 qrs. 8 lb.		39.	-	-	14 yds. 2 qrs.
15.		58 cwt. 1 qr. 20 lb.		40.	-	-	8 lb. 13 oz.
16.	-	-	£6 12s.	41.	-	-	11s. 9d. 2qr.
17.	-	-	£28 0s. 0d.	42.	-	-	£1 3s. 4d.
18.	-	-	£7 16s. 4d.	43.	-	9 cwt. 1 qr. 15 lb.	
19.	-	-	£2 13s. 4d.	44.	-	43 cwt. 1 qr. 24 lb.	
20.	-	-	£4 17s. 9d.	45.	-	3 cwt. 2 qrs. 12 lb.	
21.	-	-	£11 7s. 6d.	46.		23 yds. 1 qr. 2 m's.	
22.	-	-	£36 16s. 8d.	47.	-	7 yrs. 9 mo. 1 d.	
23.	-	-	per lb. £4 1s.	48.	-	8th March 1815	
		for the whole	£10 9s. 3d.	49.		4th June, 0 h. 36 min.	
24.	-	-	£88 0s. 8d.			34 sec.	
25.	-	-	12s. 9d.				

## X.

1. \$1
2. \$1
3. \$125 will buy  $62\frac{1}{2}$  lb.
4.  $\frac{1}{3}$  bu. will cost 1s.  $\frac{2}{3}$  bu. will cost 2s.
5. \$28 will buy  $9\frac{1}{2}$  bbls.
6.  $41\frac{1}{2}$  boxes
7.  $226\frac{2}{3}$  bottles
8. \$1, \$2, \$3
9.  $\frac{1}{2}$  &c.,  $4\frac{1}{2}$  boxes
10.  $81\frac{1}{2}$  barrels
11. \$1, \$2, &c.
12.  $\frac{1}{2}$  &c.,  $7\frac{1}{2}$  weeks
13.  $90\frac{2}{3}$  bbls.
14. \$1, \$2, \$5, \$7, \$11
15. for \$56,  $9\frac{1}{2}$  reams
16.  $72\frac{1}{2}$  bbls.
17. from Boston to New-York in  $35\frac{1}{2}$  hours
18.  $9\frac{1}{2}$  chaldrons
19.  $50\frac{1}{2}$  reams
20.  $347\frac{1}{4}$  bbls.
21.  $425\frac{1}{2}$  bbls.
22.  $106\frac{1}{2}$  cords
23.  $51\frac{1}{2}$  lb.  $111\frac{1}{2}$  lb.  $52\frac{1}{2}$  lb.
24.  $\frac{1}{18}$  cwt.  $\frac{3}{18}$  cwt.  $\frac{5}{18}$  cwt.  $\frac{7}{18}$  cwt.  $95\frac{1}{18}$  cwt.
25.  $15\frac{7}{18}$  tons
26.  $\frac{1}{18}$ ,  $\frac{2}{18}$ ,  $\frac{3}{18}$ ,  $\frac{4}{18}$ ,  $\frac{5}{18}$ ,  $2\frac{1}{18}$ ,  $26\frac{1}{18}$
27.  $38\frac{1}{2}$  gals. for \$17.53
28.  $\frac{1}{18}$  T.  $\frac{1}{18}$  T.  $\frac{2}{18}$  T.  $\frac{3}{18}$  T.  $\frac{4}{18}$  T.  $6\frac{1}{18}$  T.  $199\frac{1}{18}$  T.
29.  $\frac{1}{18}$  &c.,  $10\frac{7}{18}$  bbls.
30. - -  $47\frac{2}{3}$  galls. 33. - -  $199\frac{3}{18}$  days
31. - -  $34\frac{1}{18}$  cwt. 34. - -  $66\frac{1}{2}$  lb.
32. - -  $22\frac{2}{18}$  days 35. - -  $32\frac{1}{2}$  bushels

18		Key.			XI, XII
36.	-	-	48 $\frac{1}{2}$ lb.	46.	- - - 940 $\frac{1}{2}$
37.	-	-	15 $\frac{1}{2}$ bushels	47.	- - - 204 $\frac{3}{4}$
38.	-	-	37 $\frac{1}{2}$ gals.	48.	- - - 1559 $\frac{1}{2}$
39.	-	-	6 $\frac{1}{2}$ hours	49.	- - - 354 $\frac{1}{2}$
40.	$\frac{1}{2}$ bu.	$\frac{2}{3}$ bu.	$\frac{1}{2}$ bu.	50.	- - - 5782 $\frac{2}{3}$
	13 $\frac{1}{2}$ bu.			51.	- - - 415 $\frac{1}{2}$
41.	-	-	41 $\frac{2}{3}$ gals.	52.	- - - 399 $\frac{2}{3}$
42.	-	-	74 $\frac{2}{3}$ gals.	53.	- - - 123 $\frac{2}{3}$
43.	-	-	22 $\frac{2}{3}$ bbls.	54.	- - - 1011 $\frac{2}{3}$
44.	-	-	196 $\frac{1}{2}$	55.	- - - 8014 $\frac{1}{2}$
45.	-	-	359 $\frac{1}{2}$		

# XI.

1.	-	-	8 $\frac{1}{10}$ lb.	12.	-	-	-	387 $\frac{1}{10}$
2.	-	-	35 $\frac{4}{10}$ lb.	13.	-	-	-	4 $\frac{7}{10}$
3.	-	-	16 lb.	14.	-	-	-	67 $\frac{3}{10}$
4.	-	-	24 $\frac{3}{10}$ boxes	15.	-	-	-	487 $\frac{3}{10}$
5.	-	-	74 $\frac{2}{10}$ chald.	16.	-	-	-	34753 $\frac{3}{10}$
6.	-	-	43 $\frac{7}{10}$ bu.	17.	-	-	-	5710 $\frac{3}{10}$
7.	-	-	324 $\frac{2}{10}$ boxes	18.	-	-	-	176487 $\frac{4}{10}$ cts.
8.	-	-	243 $\frac{3}{10}$ lb.					17648 $\frac{7}{10}$ d.
9.	-	-	24 $\frac{7}{10}$ bbls.					31764 $\frac{3}{10}$
10.	-	-	87 $\frac{3}{10}$ tons	19.	-	-	-	34710 $\frac{7}{10}$
11.	-	-	7 $\frac{2}{10}$					

# XII.

1	.	.	.	.	2	.	.	.	.	3
2	.	.	.	.	4	.	.	.	.	4

5.	-	-	-	-	$\frac{7}{4}$	39.	-	-	-	$\frac{1}{2}$ gal.
6.	-	-	-	-	$\frac{1}{2}$	40.	-	-	-	$\frac{7}{32}$ gal.
7.	-	-	-	-	$\frac{9}{17}$	41.	-	-	-	$\frac{33}{32}$ gal.
8.	-	-	-	-	$\frac{1}{7}$	42.	-	-	$\frac{1}{2}$ hhd.	$\frac{17}{63}$ do.
9.	-	-	-	-	$\frac{17}{33}$	43.	$\frac{1}{30}$ hhd.	$\frac{1}{30}$	$\frac{1}{30}$	do.
10.	-	-	-	-	$\frac{14}{17}$	44.	-	-	$\frac{574}{3018}$ hhd.	
11.	-	-	-	-	$\frac{4}{67}$	45.	-	-	$\frac{1}{28}$ qr.	$\frac{13}{28}$ qrs.
12.	-	-	-	-	$\frac{1}{2}$	46.	-	-	$\frac{1}{16}$ lb.	$\frac{1}{16}$ lb.
13.	-	-	-	-	$\frac{17}{103}$	47.	-	-	$\frac{1}{336}$ lb.	$\frac{1}{336}$ lb.
14.	-	-	-	-	$\frac{103}{17}$	48.	-	-	-	$\frac{319}{336}$ lb.
15.	-	-	-	-	$\frac{39}{336}$	49.	-	$\frac{1}{105}$ qr.	$\frac{1}{105}$ qr.	
16.	-	-	-	-	$\frac{359}{39}$	50.	-	-	$\frac{4439}{198}$ qr.	
17.	-	-	-	-	$\frac{138}{387}$	51.	$\frac{1}{12}$ yr.	$\frac{1}{12}$ yr.	$\frac{1}{12}$ yr.	
18.	-	-	-	-	$\frac{8473}{38649}$	52.	$\frac{1}{30}$ mo.	$\frac{1}{30}$ mo.	$\frac{1}{30}$ mo.	
19.	-	-	-	-	$\frac{3906}{907314}$	53.	-	-	$\frac{1}{60}$ h.	$\frac{1}{60}$ h.
20.	-	-	-	-	$\frac{94483}{384}$	54.	$\frac{1}{1440}$ day,	$\frac{1}{1440}$	$\frac{1}{1440}$	day
21.	-	-	$\frac{1}{4}$ d.	$\frac{3}{4}$ d.	$\frac{3}{4}$ d.	55.	-	-	$\frac{1}{1440}$	day
22.	$\frac{1}{12}$ s.	$\frac{1}{12}$ s.	$\frac{1}{12}$ s.	&c.	$\frac{1}{12}$ s.	56.	-	$\frac{1}{38400}$ day,	&c.	
23.	$\frac{1}{48}$ s.	$\frac{3}{48}$ s.	$\frac{3}{48}$ s.	&c.	$\frac{3}{48}$ s.		$\frac{1}{38400}$	day		
24.	-	$\frac{1}{18}$ s.	$\frac{9}{48}$ s.	$\frac{3}{48}$ s.	$\frac{3}{48}$ s.	57.	-	-	$\frac{49437}{88400}$ day	
25.	$\frac{1}{20}$ £,	$\frac{3}{20}$ £,	&c.	$\frac{1}{20}$	$\frac{1}{20}$	58.	$\frac{1}{31537800}$ yr.			
26.	$\frac{1}{240}$ £,	$\frac{1}{240}$ £,	&c.	$\frac{1}{240}$	$\frac{1}{240}$		$\frac{1}{31537800}$ yr.			
27.	-	-	-	-	$\frac{39}{240}$ £	59.	-	-	$\frac{10691005}{31537800}$	
28.	-	-	-	-	$\frac{88}{240}$ £	60.	-	-	$\frac{1}{80}, \frac{8}{89}, \frac{1}{89}$	
29.	-	-	-	-	$\frac{164}{240}$ £	61.	-	-	$\frac{63}{201}$	
30.	-	-	-	-	$\frac{327}{240}$ £	62.	-	-	$\frac{43}{100}$ dol.	
31.	-	-	-	-	960 qrs.	63.	-	-	$\frac{72}{300}$ dol.	
32.	$\frac{1}{360}$ £,	$\frac{1}{360}$ £,	&c.	$\frac{1}{360}$	$\frac{1}{360}$	64.	-	-	$\frac{1}{80}$ £	$\frac{1}{80}$ £
33.	-	-	-	-	$\frac{31}{360}$ £	65.	-	$\frac{1}{1200}, \frac{1}{1200}, \frac{1}{1200}$		
34.	-	-	-	-	$\frac{46}{360}$ £	66.	-	-	$\frac{162}{1052}$	
35.	-	-	-	-	$\frac{321}{360}$ £	67.	-	-	$\frac{810}{3221}$	
36.	-	-	-	-	$\frac{648}{360}$ £	68.	-	-	$\frac{1}{12}$	
37.	-	-	-	-	$\frac{1}{4}$ gal.	69.	-	-	$\frac{31}{83}$	
38.	-	-	-	-	$\frac{1}{4}$ gal.	70.	-	-	$\frac{72}{22}$	

71.	-	-	-	$\frac{3}{4}$	78.	-	-	-	$\frac{4}{5}$
72.	-	-	-	$\frac{4}{5}$	79.	-	-	-	$\frac{5}{6}$
73.	-	-	-	$\frac{5}{6}$	80.	-	-	-	$\frac{6}{7}$
74.	-	-	-	$\frac{6}{7}$	81.	-	-	-	$\frac{7}{8}$
75.	-	-	-	$\frac{7}{8}$	82.	-	-	-	$\frac{8}{9}$
76.	-	-	-	$\frac{8}{9}$	83.	-	-	-	$\frac{9}{10}$
77.	-	-	-	$\frac{9}{10}$	84.	-	-	-	$\frac{10}{11}$

In taking the ratio of one number to another, some make the first mentioned number the numerator. I have preferred the method given, because it is the one used by Lacroix. It is not important which is used, provided it be understood.

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### XIII.

1. It will take $\frac{4}{5} = 1\frac{1}{5}$ bbls.	12.	-	-	$8\frac{4}{5}$ lb.
to last 4 weeks, and $\frac{7}{8} =$	13.	-	-	8 lb. 6 oz.
$5\frac{3}{4}$ bbls. to last 17 weeks	14.	-	-	$11\frac{1}{4}$ guin.
2. It will take $\frac{7}{8} = 1\frac{1}{8}$ bbl.	15.	-	-	11 guin. 14s.
to last 11 weeks, and $\frac{3}{4}$	16.	-	-	$19\frac{1}{2}$ days
= 4 bbls. to last 28 weeks	17.	-	-	19 d. 20 h.
3. - $\frac{7}{8} = 1\frac{1}{8}$ ; $\frac{3}{4} = 4$	18.	-	-	$162\frac{1}{2}$ hours
4. $\frac{4}{5} = 4\frac{4}{5}$ chaldrons	19.	-	-	162 h. 17 min.
5. - - - $4\frac{4}{5}$	20.	-	-	$120\frac{4}{5}$ years
6. - - - $3\frac{1}{2}$ bu.	21.	-	-	120 yr. 42 d.
7. - - - $3\frac{1}{2}$	22.	-	-	$254\frac{1}{2}$ years
8. - - - £19 $\frac{7}{8}$	23.	-	-	$10\frac{7}{8}$
9. - - - £19 7s.	24.	-	-	$100\frac{7}{8}$
10. - - - $36\frac{7}{8}$ s.	25.	-	-	$47\frac{7}{8}$
11. - - - 36s. 5d.	26.	-	-	$740\frac{21}{22}$

## XIV.

1. 7 days, 21 days, 91 days
2.  $1 = \frac{1}{7}$ ,  $3 = \frac{3}{7}$ ,  $13 = \frac{13}{7}$
3. 8 days, 57 days, 107 days, 349 days
4.  $1 = \frac{1}{8}$ ,  $7\frac{1}{8} = \frac{57}{8}$ ,  $13\frac{1}{8} = \frac{107}{8}$ ,  $43\frac{1}{8} = \frac{349}{8}$
5. 34 weeks, 202 weeks
6.  $13\frac{7}{13} = \frac{202}{13}$
7. 402 men, 2486 men
8. - - -  $\frac{402}{97}$  16. - - -  $\frac{1063}{80}$
9. - - -  $\frac{2486}{11}$  17. - - - 1063 min.
10. - - -  $\frac{13^3}{11}$  bu. 18. - - -  $\frac{8^3}{11}$  cwt.
11. - - -  $\frac{39^3}{17}$  bbls. 19. - - - 821 lb.
12. -  $\frac{42}{11}$ s. or 53d. 20. - - -  $\frac{431^3}{237}$  cwt.
13. -  $\frac{127}{30}$ £, or 167s. 21. - - -  $\frac{344^3}{11}$
14. - -  $\frac{371}{24}$  day 22. - - -  $\frac{480^3}{11}$
15. - - 371 hours 23. - - -  $\frac{1727^3}{3847}$

## XV.

1. - - - \$4 $\frac{1}{2}$  13. - - - \$108
2. - - - 6 $\frac{1}{2}$  bu. 14. - - - \$330 $\frac{1}{2}$
3. - - - 3 $\frac{1}{2}$  bbls. 15. - - - £28 11 $\frac{1}{3}$ s.
4. - - - 17 $\frac{1}{2}$  tons 16. - - - £62 5 $\frac{1}{2}$ s.
5. - - - \$2 $\frac{2}{30}$  17. - - - £16 $\frac{17^3}{3}$
6. - - - \$6 $\frac{5}{17}$  18. - - - £35 $\frac{22^3}{7}$
7. - - - \$6 $\frac{2}{30}$  19. - - - \$31 $\frac{4}{7}$
8. - - - \$24 $\frac{2}{33}$  20. - - - \$57 $\frac{4}{17}$ , 8117
9. - - - \$21 $\frac{1}{11}$  21. - - - 8206 $\frac{4}{108}$
10. - - - \$60 $\frac{4^3}{108}$  22. - - - \$573 $\frac{11^3}{89}$
11. - - - \$261 $\frac{4^3}{108}$  23. - - - 2 $\frac{1}{7}$
12. - - - \$37 $\frac{1}{2}$  24. - - - 1 $\frac{9^3}{13}$

25.	-	-	-	$2\frac{99}{273}$	29.	-	-	-	$1\frac{1179}{1179}$
26.	-	-	-	$1\frac{1107}{1111}$	30.	-	-	-	$1\frac{9679}{118403}$
27.	-	-	-	$7\frac{115}{17834}$	31.	-	-	-	$59\frac{5183}{17063}$
28.	-	-	-	$5\frac{1111}{1111}$	32.	-	-	-	$5\frac{757329}{1193703}$

## XVI.

1.	-	-	\$12	23.	$\frac{1}{2}$ of \$60.24,	\$7.53
2.	-	$\frac{1}{3}$ of \$36,	\$12	24.	$\frac{1}{12}$ of \$82.44,	\$6.87
3.	-	$\frac{1}{7}$ of \$1.54,	\$0.22	25.	$\frac{1}{18}$ of \$1692.00	\$94
4.	-	$\frac{1}{2}$ of \$126,	\$14	26.	$\frac{1}{37}$ of \$2.96	\$0.08
5.	-	$\frac{1}{17}$ of \$136,	\$8	27.	$\frac{1}{15}$ of \$52.92,	\$0.84
6.	-	-	\$193	28.	-	\$427.42
7.	captain	\$4620		29.	-	63,360 in.
	1st mate	\$3080		30.	-	21,600 geo. miles
	2d mate	\$2310		31.	-	24,912 miles
	sailors	\$539 each		32.	-	950,400 in.
8.	-	-	285 miles	33.	-	7,971,840 rods
9.	-	-	\$13.64	34.	4,735,272,960 b. corns	
10.	-	-	\$11.73	35.	-	\$1.25
11.	-	\$0.61,	\$1.22	36.	$\frac{1}{2}$ of 18 bu. $\frac{1}{3}$ of 18 bu.	
12.	-	-	\$31.33			15 bu.
13.	-	-	\$0.48	37.	in 53 h. 265 miles	
14.	\$1.05,	\$3.15,	\$7.35	38.	-	1480 miles
15.	-	\$1.65,	\$17.05	39.	-	\$222
16.	-	\$1.50,	\$26.25	40.	-	235 miles
17.	\$1.55,	\$3.10,	\$4.65	41.	\$1.43; \$90.09; \$294.58	
18.	-	-	\$23.20	42.	-	\$191.70
19.	-	-	14.10	43.	-	\$7.05
20.	-	\$1.13,	\$5.65	44.	-	\$63.52
21.	-	-	\$148.03	45.	-	\$3 11s 4d.
22.	-	$\frac{1}{2}$ of \$2.94,	\$0.42	46.	-	\$99.25

47. - - 55 bu. 1 pk. 53. - - \$11.20  
 48. - - - £213 54. - - 13,625  $\frac{11}{16}$   
 49. - - - \$56 55. 7167 & a fraction over  
 50. - - - \$93.75 56. - - 64,984  $\frac{7}{11}$   $\frac{9}{10}$   
 51. - - - \$220 57. - -  $\frac{1}{3}$  bu.  $\frac{2}{3}$  bu.  
 52. - - - £17 14s. 9d. 58. - -  $\frac{1}{3}$  bu.  $\frac{3}{5}$  bu.  
 59.  $\frac{1}{3}$  gal.  $\frac{2}{3}$  gal.  $\frac{3}{5}$  gal.  $1\frac{1}{3}$  gal.  
 60.  $\frac{1}{3}$ ;  $\frac{2}{3}$ ;  $\frac{3}{5}$ ;  $\frac{7}{5}$  =  $1\frac{2}{5}$   
 61.  $\frac{1}{3}$ ;  $\frac{2}{3}$ ;  $\frac{4}{5}$ ;  $1\frac{0}{5}$  =  $1\frac{1}{5}$  dolls.  
 62.  $\frac{1}{3}$ ;  $\frac{2}{3}$ ;  $\frac{4}{5}$ ;  $1\frac{0}{5}$  =  $1\frac{1}{5}$   
 63.  $\frac{1}{13}$  gal.  $\frac{2}{13}$  gal. &c.  $\frac{23}{13}$  =  $1\frac{10}{13}$  gal.  $\frac{47}{13}$  =  $4\frac{5}{13}$  gals.  
 64.  $\frac{1}{13}$ ;  $\frac{2}{13}$ ; &c.  $\frac{57}{13}$  =  $4\frac{5}{13}$   
 65.  $\frac{1}{23}$  dol.  $\frac{2}{23}$  dol. &c.  $\frac{34}{23}$  =  $1\frac{11}{23}$ ,  $\frac{87}{23}$  =  $3\frac{18}{23}$  dolls.  $\frac{253}{23}$  = 11 dolls.  
 66.  $\frac{1}{23}$ ,  $\frac{2}{23}$ , &c.  $\frac{87}{23}$  =  $3\frac{18}{23}$ ,  $\frac{253}{23}$  = 11  
 67.  $\frac{53}{8}$  = \$6 $\frac{1}{8}$ ; \$86.12 $\frac{1}{2}$   
 68. 8  $\frac{7}{17}$  cts.  
 69. \$6.31 $\frac{1}{4}$   
 70. \$66.92  $\frac{7}{11}$   
 71. \$532.83  $\frac{15}{8}$   
 72. \$856.66  $1\frac{1}{3}$   
 73.  $\frac{2}{3}$  bu.  $3\frac{1}{3}$  bu.

In doing these examples, make the pupil learn to *express* division, as explained in the book, Part II. Art. XVI.

74.  $\frac{1}{3}$  bbl. 10 $\frac{1}{3}$  bbls.  
 75.  $\frac{5}{23}$  bbl. 16  $\frac{7}{23}$  bbls.  
 76.  $\frac{3}{43}$  acre,  $2\frac{1}{43}$  acre,  $14\frac{1}{43}$  acre, 10  $\frac{29}{43}$  acres  
 77.  $\frac{425}{9}$  pk.  $\frac{425}{9} \times 1706\frac{2}{3} = 1706\frac{2}{3}$  pks. = 426 bu.  $2\frac{1}{3}$  pks.  
 78.  $\frac{37}{138}$  rood.  $\frac{37}{138} \times 500 = 1\frac{2500}{138} = 136\frac{4}{138}$  roods = 34 acres,  $0\frac{4}{138}$  roods.  
 79. 1 man will consume  $\frac{26}{433}$  bbl. and  $\frac{26}{433} \times 2426 = 535\frac{171}{433}$  bbls. Or 1 man will consume  $\frac{1}{433}$  of 96 bbls. and 2426 men will consume  $2426$  of 96 bbls.

Ans. 535  $\frac{171}{433}$  bbls.



80. - - - \$5.43 $\frac{1}{2}$  99. 8 galls. 2 qts. 1 pt. 2 $\frac{1}{2}$  gills.
81. - - - \$12.54 $\frac{1}{2}$
82. - - - 12s. 100. - 2 qrs. 1 $\frac{1}{2}$  nls.
83. - - - 9d. 101. - 3 qrs. 1 $\frac{1}{2}$  nl.
84. - - - 7 $\frac{1}{2}$ d. 102. - 1 qr. 1 $\frac{1}{2}$  nl.
85. - - - 2 $\frac{1}{2}$  qrs. 103. - - \$0.428 $\frac{1}{2}$
86. - - - 7 $\frac{1}{2}$ d. 104. - - \$0.178 $\frac{1}{2}$
87. - - 6d. 3 $\frac{1}{2}$  qrs. 105. - - \$0.127 $\frac{1}{2}$
88. - - - 7s. 6d. 106. - 7s. 9d. 3 $\frac{1}{2}$  qrs.
89. - • 14s. 3d. 1 $\frac{1}{2}$  qrs. 107. - 7s. 6d. 3 $\frac{2}{3}$  qrs.
90. - 4s. 3d. 1 $\frac{1}{2}$  qrs. 108. - - 9s. 7 $\frac{5}{8}$ d.
91. 13 h. 42 min. 51 $\frac{1}{2}$  sec. 109. 1 qt. 1 pt. 3 $\frac{1}{2}$  gills.
92. - 22 min. 30 sec. 110. - - 6 $\frac{5}{8}$ d.
93. 9 h. 13 min. 50 $\frac{1}{2}$  sec. 111. - - 16 hours
94. 6 h. 43 min. 12 sec. 112. - - \$0.20
95. - - - 6 oz. 113. - - 3 $\frac{1}{2}$  qrs.
96. - - 2 qrs. 8 lb. 114. - 1 pk. 5 $\frac{1}{2}$  qts.
97. 1 qr. 4 lb. 15 $\frac{1}{2}$  oz. 115. - 7 oz. 12 $\frac{1}{2}$  dr.
98. - 17 galls. 2 qts. 116. - 5s. 3d. 1 $\frac{1}{2}$  qrs.
117. 12s. 9 $\frac{30}{100}$  d.
118. 8s. 6d. 3 $\frac{1}{2}$  qrs.
119. 1 qr. 5 lb. 11 oz. 15 $\frac{1}{2}$  drs.
120. 2 d. 16 h. 8 min. 17 $\frac{21}{100}$  sec.
121. 22 gals. 3 $\frac{1}{2}$  qts.
122. In this example find  $\frac{2}{3}$  of a hhd. in galls. and then multiply the price of 1 gall. by it; or first find the price of 1 hhd. and take  $\frac{2}{3}$  of that. The latter method is generally preferable. *Ans.* \$37.85 $\frac{7}{10}$ .
123. \$8.10 $\frac{10}{100}$
124. \$350.
125. \$63.66 $\frac{1}{2}$
126. \$260.06 $\frac{1}{2}$
127. \$2174.88 $\frac{1}{2}$
128. \$4231.65 $\frac{1}{2}$

129. 4 bushels will come to 20s. then 3 pks. 5 qts. = 29 qts. =  $2\frac{2}{3}$  bu.  $\frac{2}{3}$  of 5s. = 4s.  $6\frac{1}{2}$ d. Ans. £1 4s.  $6\frac{1}{2}$ d.
130. 3 cwt. will come to \$27; 2 qrs. 7 lb. =  $\frac{6}{11}\frac{3}{4}$  cwt  $\frac{6}{11}\frac{3}{4}$  of \$9 = \$5.06  $\frac{3}{11}\frac{3}{4}$  Ans. \$32.06  $\frac{3}{11}\frac{3}{4}$
131. \$1348.50
132. \$28.86  $\frac{1}{11}\frac{3}{4}$
133.  $7\frac{4}{11}\frac{7}{8}$ d. per grain. This multiplied by the number of grains in an ounce will give the price of an ounce. Ans. 6s.  $8\frac{4}{11}\frac{9}{8}$ d.
134. \$1.19  $\frac{7}{100}\frac{1}{2}$
135. Reduce the 34 tons, &c. to pounds, and make it the denominator, and \$6500.00 the numerator of a fraction; this will be the price of 1 pound in parts of a cent. Multiply this by the number of pounds in a ton, and reduce it, and it will be the answer. Ans. \$188.49  $\frac{4}{11}\frac{5}{12}\frac{1}{2}$
136. \$0.055 per lb.
137. \$4.055  $\frac{1}{11}\frac{1}{2}$  per yd. 142. - \$6.50 per bbl.
138. \$0.244  $\frac{1}{10}\frac{9}{11}$  per lb. 143. - \$6.685  $\frac{1}{11}\frac{3}{4}$  per yd.
139. - \$1.56 per gal. 144. - \$0.36 per gal.
140. - - \$325 145. - \$0.178  $\frac{4}{11}\frac{1}{2}$  per lb.
141. \$1.507  $\frac{1}{10}\frac{3}{4}$  per gal. 146. \$0.028  $\frac{1}{11}\frac{1}{4}$  per lb.
147. It will take 1 boarder 8 times as long, that is, 96 days; and it would take 12 boarders  $\frac{1}{12}$  part of that time, or 8 days. Ans. 8 days.
148. - - 92 men 152. - - 12 days
149. - - 42 men 153. - - 20  $\frac{4}{11}$  days
150. - - 14  $\frac{1}{2}$  days 154. - 27  $\frac{1}{2}$  miles
151. - - 11  $\frac{7}{8}$  days 155. - - 33  $\frac{3}{4}$  bu.
156. Find how many men it would take, if the days were one hour long, and then how many, when they are 11 hours. Ans. 15 men.
157. Find how many months it would take them, if they worked only 1 hour in a day, and then how many, if they worked 10 hours. Ans. 3  $\frac{5}{11}$  months.

158. A's share \$576, B's \$288
159. A's share \$2994.008 $\frac{4}{11}$   
 B's do. \$3346.244 $\frac{1}{11}$   
 C's do. \$2113.417 $\frac{2}{11}$
160. Both together paid \$8, B paid  $\frac{4}{5}$ , and C  $\frac{3}{5}$  of it. They ought to receive in the same proportion.
161. \$100. C  $\frac{47}{100}$  and D  $\frac{53}{100}$   
 C's share 29 $\frac{1}{100}$  galls. D's 33 $\frac{3}{100}$  galls.
162. C's share  $\frac{360}{3770}$  of \$1353.18 = \$386.103 $\frac{111}{111}$   
 D's do.  $\frac{242}{3770}$  of do. = \$427.893 $\frac{111}{111}$   
 E's do.  $\frac{111}{3770}$  of do. = \$539.182 $\frac{111}{111}$
163. A's share \$1397.653 $\frac{744}{111}$   
 B's do. \$5241.199 $\frac{111}{111}$   
 C's do. \$3843.546 $\frac{111}{111}$   
 D's do. \$2620.599 $\frac{111}{111}$   
 E's do. \$297.001 $\frac{111}{111}$
164. F's share \$3277.50  
 G's do. \$6397.50  
 H's do. \$5325
165. The first \$9.333 $\frac{4}{11}$   
 The second \$14  
 The third \$18.666 $\frac{1}{11}$
166. A receives \$179.777 $\frac{724}{111}$   
 B " \$402.187 $\frac{544}{111}$   
 C " \$914.295 $\frac{440}{111}$   
 D " \$1476.740 $\frac{311}{111}$

The last nine examples are what is usually called *Simple Fellowship*, for which we deduce the following rule:—Find the stock invested, and make it the denominator, and each man's particular share the numerator of a fraction. These fractions will express each man's proportion of the sum to be received or to be paid.

167. - 18106 $\frac{1084}{111}$  169. - - - 159 $\frac{2}{111}$   
 168. - - 22 $\frac{4832}{111}$  170. - - - 1 $\frac{841}{111}$

171.	-	-	-	$2\frac{1}{3}\frac{2}{3}$	176.	-	-	$29\frac{1}{3}\frac{2}{3}$
172.	-	-	-	$3\frac{1}{3}\frac{2}{3}$	177.	-	-	$133\frac{1}{3}\frac{2}{3}$
173.	-	-	-	$677\frac{1}{3}\frac{2}{3}$	178.	-	-	$133\frac{1}{3}\frac{2}{3}$
174.	-	-	-	$677\frac{1}{3}\frac{2}{3}$	179.	-	-	$18\frac{1}{3}\frac{2}{3}$
175.	-	-	-	$29\frac{1}{3}\frac{2}{3}$	180.	-	-	$18\frac{1}{3}\frac{2}{3}$

## XVII.

1.	-	-	-	$\frac{1}{2}$ dol.	9.	-	-	$126\frac{1}{2}$ bu.
2.	-	$\frac{2}{3}$ dol.	$3\frac{1}{3}$ dols.		10.	-	-	$\$107\frac{1}{2}$
3.	-	-	-	$\frac{1}{2}$ bbl.	11.	-	-	$5\frac{1}{2}$ miles
4.	-	$\frac{3}{4}$ ton.	$1\frac{1}{4}$ ton		12.	-	-	$59\frac{1}{2}$ miles
5.	-	-	-	$\$10\frac{1}{2}$	13.	-	-	$5\frac{1}{2}$ bu.
6.	-	-	-	$\$30\frac{1}{2}$	14.	-	-	$\$7\frac{1}{2}$
7.	-	-	-	$137\frac{1}{2}$ shil.	15.	-	-	$\$24\frac{1}{2}$
8.	-	$7\frac{1}{2}$ bu.	$390$ bu.					

Observe that in all the above examples, the division may be performed by dividing the numerator. In most of those which follow this cannot be done.

16.	-	$\frac{1}{4}$ of a melon	23.	-	-	-	$\frac{1}{10}$
17.	-	$\frac{1}{2}$ of the apple	24.	-	-	-	$\frac{2}{15}$ bbl.
18.	-	$\frac{2}{3}$ of a bushel	25.	-	-	-	$\frac{1}{15}$
19.	-	-	-	$\frac{2}{3}$	26.	-	$\frac{2}{17}$ dol.
20.	-	$\frac{1}{2}$ bushel	27.	-	-	-	$\frac{2}{17}$
21.	-	-	$\frac{1}{2}$	28.	-	-	$\frac{2}{17}$ dol.
22.	-	-	$\frac{1}{10}$ bbl.				
29.	$\frac{1}{2}$ dol.	$\frac{2}{3}$ dol.	$\frac{7}{6} = 1\frac{1}{6}$ dol.				
30.	$\frac{1}{2}$ .	$\frac{2}{3}$ .	$\frac{7}{6} = 1\frac{1}{6}$				
31.	$\frac{2}{3}$ dol.	$\frac{1}{2}$ dol.	$\frac{4}{3} = 1\frac{1}{3}$ dol.				
32.	$\frac{2}{3}$ .	$\frac{1}{2}$ .	$\frac{4}{3} = 1\frac{1}{3}$				
33.	$\frac{2}{3}$ .	of the loss					

34. He sold  $\frac{12}{375}$ . He owned at first  $\frac{3}{5}$  of the whole.  $\frac{1}{3} = \frac{12}{375}$  and  $\frac{3}{5} = \frac{33}{375}$ ; out of these he sold  $\frac{12}{375}$ , consequently he had  $\frac{21}{375}$  left. Ans. He sold  $\frac{12}{375}$ , and had  $\frac{21}{375}$  left
35.  $5\frac{1}{2} = \frac{11}{2}$ ;  $\frac{1}{3}$  of  $\frac{11}{2}$  is  $\frac{11}{6}$ , and  $\frac{2}{3}$  of  $\frac{11}{2}$  is  $\frac{22}{3} = 3\frac{2}{3}$ . Ans.  $3\frac{2}{3}$  dollars
36.  $1\frac{1}{2}$ .  $3\frac{1}{2}$
37.  $1\frac{2}{3}$  bu.  $4\frac{3}{4}$  bu.
38.  $1\frac{1}{3}$ .  $4\frac{3}{4}$ , or  $4\frac{1}{2}$
39.  $\$145\frac{4}{5} = \$145.305\frac{4}{5}$
40.  $145\frac{4}{5}$
41.  $\frac{1099}{384}$  dol.  $\frac{1099}{10752}$  dol. =  $\$0.102\frac{2299}{10752}$
42.  $59\frac{1}{5}$  gals.
43.  $\$50.00$
44.  $\$15\frac{44}{113} = \$15.296\frac{4}{113}$
45.  $\$1\frac{1}{2}$ .  $\$7\frac{72}{1134} = \$0.663\frac{118}{1134}$
46.  $\$34\frac{2}{3} = 3.648\frac{2}{3}$
47.  $\$2\frac{1}{4} = \$2.952\frac{3}{4}$
48.  $\$16\frac{1}{5} = \$16.133\frac{2}{5}$
49.  $\$4\frac{2}{7} = \$4.74$
50.  $\$1\frac{2}{3} = \$0.66\frac{2}{3}$
51.  $26\frac{1}{3} = £1. 6s. 0\frac{2}{3}d.$
52. - - -  $\frac{1}{4}$  bbl. 55. - - -  $3\frac{3}{4}$  gals.
53. - - -  $\frac{1}{2}$  yd. 56. - - -  $5\frac{1}{2}$  qts.
54. - - -  $2\frac{1}{2}$  yds. 57. - - -  $7\frac{1}{11}$  bbls.
58.  $\$25\frac{3}{4} = \$25.083\frac{3}{4}$
59.  $\$5$ .  $\$15\frac{1}{2} = \$15.75$
60.  $£15\frac{1}{3} = £15 7s. 8d.$

In this example, say  $£17 15s. = £17\frac{1}{4} = £3\frac{3}{4}$ ; then  $\frac{1}{3}$  multiplied by  $\frac{3}{4} = £15\frac{1}{4}$ .—Or first multiply  $\frac{1}{3}$  by 17, which makes  $£14\frac{1}{3} = £14 14s. 8d.$  If he can pay  $\frac{1}{3}$  of a pound on a pound, he can pay  $\frac{1}{3}$  of the whole debt, but we have already taken  $\frac{1}{3}$  of  $£17$ , we have now to take  $\frac{1}{3}$  of  $15s.$  which is  $13s.$ ; this added to  $£14 14s. 8d.$  makes  $£15 7s. 8d.$  as before.

61.  $\frac{17}{16}\text{£}$ ; consequently he can pay  $\frac{17}{16}$  of the whole debt, or  $\frac{17}{16}$  of a shilling on a shilling. Ans.  $\text{£}125\ 10\text{s. } 10\frac{1}{2}\text{d.}$
- |     |   |   |   |                     |     |   |   |   |                      |
|-----|---|---|---|---------------------|-----|---|---|---|----------------------|
| 62. | - | - | - | $\frac{7}{37}$      | 74. | - | - | - | $4\frac{1}{2}$ times |
| 63. | - | - | - | $\frac{4}{133}$     | 75. | - | - | - | $5\frac{3}{133}$     |
| 64. | - | - | - | $\frac{4}{133}$     | 76. | - | - | - | $14\frac{3}{133}$    |
| 65. | - | - | - | $\frac{2}{103}$     | 77. | - | - | - | $\frac{2}{103}$      |
| 66. | - | - | - | $\frac{11}{113}$    | 78. | - | - | - | $\frac{1}{103}$      |
| 67. | - | - | - | $\frac{13}{113}$    | 79. | - | - | - | $\frac{47}{1004}$    |
| 68. | - | - | - | $\frac{11}{110}$    | 80. | - | - | - | $\frac{73}{13373}$   |
| 69. | - | - | - | $\frac{11}{110}$    | 81. | - | - | - | $\frac{3}{4}$        |
| 70. | - | - | - | $2\frac{219}{4373}$ | 82. | - | - | - | $\frac{119}{113}$    |
| 71. | - | - | - | $2\frac{196}{133}$  | 83. | - | - | - | $\frac{227}{1330}$   |
| 72. | - | - | - | $3320\frac{1}{2}$   | 84. | - | - | - | $\frac{22}{3373}$    |
| 73. | - | - | - | $28851\frac{1}{2}$  |     |   |   |   |                      |

## XVIII.

1.  $\$ \frac{1}{2}$   $\$1$

Be careful to make the learner perform these examples by dividing the denominator

2.  $\$ \frac{1}{2}$ .  $\$ \frac{1}{2}$ .  $\$1$
3.  $\frac{4}{5} = 1\frac{1}{5}$  bu.  $\frac{4}{5} = 2\frac{1}{5}$  bu. 5 bu.
4.  $\frac{4}{5} = 1\frac{1}{5}$  bu. 4 bu.
5.  $\frac{1}{2}$  of it.  $\frac{1}{2}$ .  $\frac{1}{2}$ .  $\frac{1}{2}$ . The whole
6.  $\frac{3}{10}$  bbl.  $\frac{3}{10}$  bbl.  $\frac{3}{10}$  bbl.  $\frac{3}{10}$  bbl. 3 bbl.
7.  $8\frac{1}{2} = 9\frac{1}{2}$  bu. 19 bu.
8.  $35\frac{1}{2}$  bbls.
9.  $\frac{43}{133}$  ton.  $\frac{43}{133} = 1\frac{1}{3}$  ton
10.  $8\frac{1}{2} = 14\frac{1}{2}$  yds. 43 yards
11.  $\$32\frac{1}{4} = \$32.70$ .  $\$81\frac{1}{2} = \$81.75$
12. - - -  $\frac{4}{7}$  14. - -  $\frac{4}{7} = 14\frac{1}{2}$
13. - - -  $7\frac{1}{2}$  15. - - -  $1\frac{1}{2}$

16.	-	-	-	$1\frac{18}{17}$	24.	-	-	-	11
17.	-	-	-	$1\frac{14}{17}$	25.	-	-	-	38
18.	-	-	-	$48\frac{7}{10}$	26.	-	-	-	327
19.	-	-	-	$1217\frac{1}{2}$	27.	-	-	-	1114
20.	-	-	-	$411\frac{11}{17}$	28.	-	-	-	14186
21.	-	-	-	7	29.	-	-	-	12069
22.	-	-	-	4	30.	-	-	-	14095
23.	-	-	-	15					

## XIX.

1.	-	-	95 yds.	7.	-	$\frac{1}{2}$ of the apple
2.	-	$\$16\frac{1}{2} = \$16.875$		8.	-	$\$24\frac{1}{2} = \$24.875$
3.	-	-	$88\frac{2}{10}$ bu.	9.	-	$22\frac{1}{10}$ cwt.
4.	-	-	$5\frac{1}{2}$ bu.	10.	-	$15\frac{1}{2}$ yds.
5.	-	-	$2\frac{1}{2}$ yds.	11.	-	$45\frac{1}{11}$ bu.
6.	-	-	$18\frac{1}{13}$ lb.			
12.	$14\frac{4}{17}$ cwt.	$= 14$ cwt. 1 qr. $1\frac{1}{2}$ lb.				
13.	$1\frac{2}{3}$ tons	$= 1$ T. 3 cwt. 1 qr. 20 lb.				
14.	-	$\frac{9}{10}$ above water	24.	-	-	$\frac{11}{11}$
15.	-	- $6\frac{1}{2}$ cwt.	25.	-	-	$30\frac{1}{2}$
16.	-	$23\frac{1}{2}$ gals.	26.	-	-	$407\frac{1}{2}$
17.	-	$41\frac{1}{10}$ cwt.	27.	-	-	$\frac{4}{17}$
18.	-	$38\frac{11}{17}$ cwt.	28.	-	-	$\frac{1}{11}$
19.	-	1347 years old	29.	-	-	$4\frac{2}{11}$
20.	-	$28\frac{11}{17}$ years old	30.	-	-	$38\frac{1}{2}$
21.	-	$5\frac{1}{2}$ years	31.	-	-	$14\frac{1}{2}$
22.	-	- $\frac{1}{11}$	32.	-	-	$528\frac{1}{11}$
23.	-	- $1\frac{1}{10}$				

## XX.

1.	-	-	-	\$23	16.	-	-	-	$12\frac{1}{2}$
2.	-	-	-	\$5.29	17.	-	-	-	$27\frac{1}{8}$
3.	-	-	-	\$7.37	18.	-	-	-	$49\frac{1}{2}$
4.	$\$406\frac{4}{11} = \$406.19\frac{1}{11}$				19.	-	-	-	$601\frac{1}{3}$
5.	$\$14\frac{2}{3} = \$1.793\frac{1}{3}$				20.	-	-	-	$176\frac{1}{12}$
6.	$\$28\frac{7}{8} = \$28.233\frac{1}{8}$				21.	-	-	-	$146\frac{1}{10}$
7.	-	$44\frac{3}{4}$	lb.		22.	-	-	-	$120\frac{1}{10}$
8.	-	$76\frac{2}{3}$	hhd.		23.	-	-	-	$4\frac{1}{10}$
9.	-	$14\frac{1}{10}$	bbls.		24.	-	$1\frac{2}{1000} = 1\frac{1}{500}$		$1\frac{1}{500}$
10.	-	$27\frac{1}{2}$	tons		25.	-	-	-	$403\frac{1}{2}$
11.	-	$\$4.01\frac{1}{10}$			26.	-	-	-	$86\frac{1}{1000}$
12.	-	-		28	27.	$9\frac{1}{1000000} = 9\frac{1}{1000000}$			$9\frac{1}{1000000}$
13.	-	-		28	28.	$12\frac{1}{1000000} = 12\frac{1}{1000000}$			$12\frac{1}{1000000}$
14.	-	-		24	29.	-	-	-	$1866\frac{1}{10}$
15.	-	-		42	30.	-	-	-	$31\frac{1}{1000000}$

## XXI.

1. The divisors  
of 15 are 3, 5\*  
' 18 ' 2, 3, 6, 9  
' 20 ' 2, 4, 5, 10  
' 21 ' 3, 7  
' 24 ' 2, 3, 4, 6, 8, 12  
' 28 ' 2, 4, 7, 14  
' 42 ' 2, 3, 6, 7, 14, 21  
' 48 ' 2, 3, 4, 6, 8, 12, 16, 24  
' 64 ' 2, 4, 8, 16, 32  
' 72 ' 2, 3, 4, 6, 8, 9, 12, 18, 24, 36  
' 88 ' 2, 4, 8, 11, 22, 44  
' 98 ' 2, 7, 14, 49

\* Every number is divisible by itself.



## 2. The divisors

of 108 are 2, 3, 4, 6, 9, 12, 18, 27, 36, 54

‘ 112 ‘ 2, 4, 7, 8, 14, 16, 28, 56

‘ 114 ‘ 2, 3, 6, 19, 38, 57

‘ 120 ‘ 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60

‘ 387 ‘ 3, 9, 43, 129

‘ 432 ‘ 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 27, 36, 48, 54, 72,  
108, 144, 216

‘ 846 ‘ 2, 3, 6, 9, 18, 47, 94, 141, 282, 423

‘ 936 ‘ 2, 3, 4, 6, 8, 9, 12, 13, 18, 24, 26, 36, 39, 52, 72,  
78, 104, 117, 156, 234, 312, 468

## 3. The divisors

of 8000 are 2, 4, 5, 8, 10, 16, 20, 25, 32, 40, 50, 64,  
80, 100, 125, 160, 200, 250, 320, 400, 500,  
1000, 1600, 2000, 4000

‘ 4053 ‘ 3, 1351

‘ 1864 ‘ 2, 4, 8, 233, 466, 932

‘ 2480 ‘ 2, 4, 5, 8, 10, 16, 20, 40, 62, 124, 155, 248  
310, 496, 620, 1240‘ 24,876 ‘ 2, 3, 4, 6, 9, 12, 18, 36, 691, 1382, 2073,  
2764, 4149, 6219, 8292, 12438‘ 103,284 ‘ 2, 3, 4, 6, 9, 12, 18, 36, 2869, 5738, 8607,  
11476, 17214, 25821, 34428, 51642‘ 7,328,472 ‘ 2, 3, 4, 6, 8, 12, 24, 305353, 610706, 916059  
1221412, 1832118, 2442824, 3664236

4. - - 2, 4, 8 12. - - - 3, 9

5. - - - 2, 4 13. - - -  $\frac{1}{2}$ 6. - - - 2, 3, 6 14. - - -  $\frac{2}{3}$ 7. - - - 7 15. - - -  $\frac{1}{5}$ 8. - - - 2, 4, 8 16. - - -  $\frac{1}{4}$ 9. - - - 3 17. - - -  $\frac{1}{3}$ 10. - - - 2, 4, 8 18. - - -  $\frac{1}{6}$ 11. - - 2, 3, 6, 18 19. - - -  $\frac{1}{18}$

## XXII.

1.	-	-	-	$\frac{9}{12}, \frac{4}{12}$	13.	-	-	-	1440
2.	-	-	-	$\frac{31}{36}, \frac{8}{36}$	14.	-	-	-	10,500
3.	-	-	-	$\frac{44}{48}, \frac{2}{48}$	15.	-	-	-	13,500
4.	-	-	-	$\frac{21}{24}, \frac{10}{24}$	16.	-	-	-	$\frac{21}{24}, \frac{40}{24}$
5.	-	-	-	$\frac{14}{36}, \frac{14}{36}$	17.	-	-	-	$\frac{8}{24}, \frac{7}{24}$
6.	-	-	-	24	18.	-	-	-	$\frac{74}{276}, \frac{80}{276}, \frac{51}{276}$
7.	-	-	-	56	19.	-	-	-	$\frac{96}{216}, \frac{134}{216}, \frac{148}{216}, \frac{64}{216}$
8.	-	-	-	45	20.	-	-	-	$\frac{144}{672}, \frac{44}{672}, \frac{130}{672}$
9.	-	-	-	90	21.	-	-	-	$\frac{2104}{48008}, \frac{3317}{48008}$
10.	-	-	-	210	22.	-	-	-	$\frac{280}{38000}, \frac{42}{38000}$
11.	-	-	-	840	23.	-	-	-	$\frac{276}{3000}, \frac{176}{3000}$
12.	-	-	-	1680	24.	-	-	-	$\frac{434}{72000}, \frac{61}{72000}$

## XXIII.

1.	-	15 bu. ; $7\frac{1}{2}$ bu.	10.	-	-	$871\frac{1}{2}$ axes
2.	-	30 peaches ; 15 do.	11.	-	-	12 acres
3.	-	24 labourers ; 8 do.	12.	-	-	$19\frac{1}{2}$ acres
4.	-	24 acres	13.	-	-	$12\frac{1}{2}$ bu.
5.	-	$67\frac{1}{2}$ boxes	14.	-	-	$11\frac{1}{2}$ bbls.
6.	-	$236\frac{1}{2}$ bottles	15.	-	-	$4\frac{1}{2}$ acres
7.	-	$46\frac{1}{2}$ weeks	16.	-	-	14 tons
8.	-	80 days ; 160 persons	17.	-	-	$443\frac{2}{3}$ lb.
9.	-	$184\frac{2}{3}$ days	18.	-	-	$62\frac{2}{3}$ days
19.	-	$57\frac{1}{2}$ coats				
20.	-	$7\frac{2}{11}$ rods = 7 rods, $4\frac{1}{2}$ yds.				
21.	-	$15\frac{2}{11}$ rods = 15 rods, $4\frac{1}{2}$ yds.				
22.	-	$51\frac{2}{3}$ rods = 51 rods, 3 yds. 2 ft. 6 in.				
23.	-	$3\frac{1}{3}$ fur. = 3 fur. 29 rods, 4 yds. 2 ft. 6 in.				
24.	-	$8\frac{1}{11}$ = $8\frac{1}{11}$ miles = 8 miles, 2 fur. 18 rods, 5 yds.				

25. - - - 3 bu. 32. - - 6 lb. 12 lb.  
 26. - 4 dozen; 7 do. 33. -  $6\frac{2}{3}$  bu.  $2\frac{2}{3}$  bu.  
 27. - 2 dozen;  $6\frac{1}{2}$  do. 34. -  $5\frac{1}{2}$  bu.  $2\frac{1}{2}$  bu.  
 28. -  $2\frac{1}{3}$  bu.  $14\frac{1}{3}$  bu. 35. - -  $\frac{1}{3}$  bu.  $\frac{2}{3}$  bu.  
 29. - - 4 lb. 9 lb. 36. - -  $\frac{2}{3}$  bu.  $\frac{1}{3}$  bu.  
 30. - - -  $4\frac{1}{2}$  bu. 37. - 54 eggs  
 31. - -  $2\frac{1}{2}$  weeks 38. -  $11\frac{1}{2}$  penny loaves  
 39.  $2\frac{1}{3}$  four-penny loaves  
 40.  $11\frac{1}{2}$  two-penny loaves.  $58\frac{1}{2}$  do.  
 41.  $2\frac{1}{2}$  six-penny loaves. 14 do.  
 42. - -  $7\frac{1}{10}$  hats 55. - -  $91\frac{1}{2}$  times  
 43. - -  $7\frac{1}{10}$  hats 56. - -  $370\frac{1}{3}$  times  
 44. - -  $9\frac{1}{4}$  bu. 57. - -  $13\frac{3}{11}$  times  
 45. - -  $9\frac{1}{4}$  bu. 58. - -  $39\frac{1}{11}$  times  
 46. - -  $25\frac{1}{4}$  coats 59. - -  $16\frac{1}{4}$  times  
 47. - -  $7\frac{1}{4}$  weeks 60. - -  $139\frac{1}{3}$  times  
 48. - -  $19\frac{2}{3}$  suits 61. - -  $6\frac{1}{17}$  times  
 49. -  $19\frac{2}{3}$  days 62. - -  $6\frac{1}{17}$  times  
 50. - -  $44\frac{1}{6}$  cows 63. - -  $59\frac{1}{6}$   
 51. -  $3\frac{1}{6}$  chaldrons 64. - - -  $\frac{1}{4}$  bbl.  
 52. - -  $17\frac{1}{3}$  cwt. 65. -  $\frac{1}{3}$  bbl.  $\frac{2}{3}$  do.  
 53. -  $15\frac{1}{3}$  casks 66.  $\frac{1}{3}$  cwt.  $\frac{2}{3}$  do.  $\frac{1}{3}$  do.  
 54.  $30\frac{1}{3}$  =  $30\frac{1}{3}$  tons 67. - -  $\frac{2}{3}$  ton  
 68.  $\frac{7}{8}$  =  $\frac{3}{4}$ , and  $\frac{3}{4}$  =  $\frac{1}{2}$ . Ans.  $\frac{1}{2}$  of a bushel  
 69.  $2\frac{1}{2}$  =  $\frac{1}{2}$  =  $\frac{1}{3}$ , and  $3\frac{1}{2}$  =  $\frac{2}{3}$  =  $\frac{1}{3}$

These being reduced to a common denominator have the same relation as their numerators; therefore take the numerators and proceed with them as if they were whole numbers. See Art. XVI. example 158, and the following.  $115 + 91 = 206$ . One paid  $\frac{1}{10}$  and the other  $\frac{2}{10}$  of the whole, and they should have the same proportions. Ans.  $\frac{91}{206}$  and  $\frac{115}{206}$  respectively.

70.  $5\frac{1}{2}$  =  $\frac{1}{2}$  =  $\frac{2}{3}$ , and  $7\frac{1}{2}$  =  $\frac{2}{3}$  =  $\frac{1}{3}$ .  $33 + 46 = 79$

The first should pay  $\frac{2}{3}$ , and the second  $\frac{1}{3}$  of 21 dolls. Ans.

$\$8\frac{1}{4} = 8.875$ , and  $\$12\frac{1}{4} = 12.25$  respectively.

71.	-	-	-	$\frac{136}{133}$	76.	-	-	-	$\frac{141}{139}$
72.	-	-	-	$\frac{137}{119}$	77.	-	-	-	$\frac{127}{267}$
73.	-	-	-	$\frac{132}{111}$	78.	-	-	-	$\frac{1441}{2033}$
74.	-	-	-	$\frac{144}{1361991}$	79.	-	-	-	$\frac{74}{1818612}$
75.	-	-	-	$\frac{8}{11}$					

## XXIV.

1.	-	-	-	\$1.50	18.	-	-	\$198760 $\frac{1}{10}$
2.	-	-	-	\$26.75	19.	-	-	\$0.40
3.	-	-	-	\$8.625	20.	-	-	8 cents
4.	-	-	-	\$108	21.	-	-	\$2. 88
5.	-	-	-	\$192.80	22.	-	-	\$0.30. \$2.40
6.	-	-	-	\$99.44	23.	-	-	\$0.19. \$1.52
7.	-	-	-	\$127005	24.	-	-	\$2. \$10
8.	-	-	-	\$233334	25.	-	-	\$0.60. \$4.20
9.	-	-	-	\$474679.66	26.	-	-	\$20
10.	-	-	-	\$215665.58	27.	-	-	40 miles
11.	-	-	-	$\frac{2}{3}$ doll.	28.	-	-	\$6.79
12.	-	-	-	$\frac{1}{4}$ doll.	29.	24 years is $\frac{3}{8}$ of his age.		
13.	-	-	-	\$1 $\frac{1}{2}$		Ans. 64 years		
14.	-	-	-	\$2 $\frac{3}{4}$	30.	-	-	\$91.26
15.	-	-	-	\$6 $\frac{1}{2}$	31.	-	-	\$7 $\frac{1}{2}$ = \$7.50
16.	-	-	-	\$98 $\frac{1}{4}$	32.	-	5 $\frac{3}{4}$ cents.	\$0.45 $\frac{1}{2}$
17.	-	-	-	\$113 $\frac{9}{17}$	33.	-	-	2 $\frac{1}{2}$ cents
34.	\$1 $\frac{1}{4}$ = 1.25.			\$16 $\frac{1}{4}$ = 16.25				
35.	6 $\frac{1}{2}$ miles.							
36.	\$74666 $\frac{1}{2}$ = 74666.66 $\frac{1}{2}$							
37.	\$18750.							
38.	\$305075 $\frac{1}{4}$ = 305075.89 $\frac{1}{4}$							
39.	\$6 $\frac{1}{2}$ = 6.60							

40.  $2\frac{1}{2} = \frac{1^3}{5}$ .  $\frac{1}{5}$  of 13s. is 1s. and  $5 \times 1 = 5$ . Ans. 5s.
41.  $8\frac{9}{13} = \frac{11^3}{13}$ ;  $\frac{1}{13}$  of 15 is  $\frac{1^5}{13}$ , and 13 times this is  $\frac{1^9}{13} = \$1\frac{8^2}{13}$ .  $\$86\frac{3^2}{13} = 86.28\frac{2^6}{13}$
42. Find the price of 1 cwt., as in the last, and let it stand in the form of an improper fraction; then reduce  $17\frac{1}{2}$  to an improper fraction and multiply by it.  
Ans.  $\$198\frac{1^5}{2} = \$198.19\frac{1^5}{2}$
43.  $\$2\frac{2}{7}$ .  $\$1\frac{1}{2}$
44.  $\$4\frac{2}{5}$ .  $\$4\frac{8}{5}$
45.  $\$4\frac{9}{5}$
46.  $1\frac{5^9}{13^8}$  month.  $7\frac{2^3}{13^8}$  do.
47.  $\$10\frac{1}{5}$ .  $\$178\frac{1}{5} = 178.38\frac{1}{5}$
48.  $\$145\frac{7}{10} = 145.35$
49.  $\$4\frac{17}{25} = 4.07\frac{1}{5}$
50.  $\$5\frac{1^9}{3^3 1^7} = 5.30\frac{1}{3}$
51.  $1\frac{4^3}{13^7 9}$  bbls.  $\frac{1^3}{18 1^9}$  yds.
52.  $\pounds 1\frac{1}{2} = 17s. 2\frac{1}{2}d.$
53.  $\pounds 93\frac{1}{2} = \pounds 93 \text{ 9s. } 7\frac{1}{2}d.$
54. He sold  $\frac{6}{5}$  of the whole. The vessel was worth  $\$49000$
55.  $\pounds 2653\frac{1}{9} = \pounds 2653 \text{ 1s. } 2\frac{1}{2}d.$
56.  $9\frac{1}{2}$  days
57.  $7\frac{1}{2}$  days
58.  $52\frac{1}{2}$  acres
59. There is  $\frac{4}{5}$  of it in the mud; and in the mud and water both there is  $\frac{1}{2}$  of it; therefore  $7\frac{1}{2}$  is  $\frac{3}{2}$  of the whole pole. Ans.  $12\frac{7}{4} \text{ ft.} = 12 \text{ ft. } 3\frac{1}{2} \text{ inches.}$
- |     |   |   |   |                   |     |   |   |   |                          |
|-----|---|---|---|-------------------|-----|---|---|---|--------------------------|
| 60. | - | - | - | \$160             | 67. | - | - | - | $24\frac{1}{3}$          |
| 61. | - | - | - | \$120             | 68. | - | - | - | $52\frac{1}{2}$          |
| 62. | - | - | - | 72                | 69. | - | - | - | $5162\frac{1}{2}$        |
| 63. | - | - | - | 864               | 70. | - | - | - | $3681\frac{1}{2}$        |
| 64. | - | - | - | $95\frac{1}{2}$   | 71. | - | - | - | $254\frac{1^3}{13}$      |
| 65. | - | - | - | $173\frac{1}{13}$ | 72. | - | - | - | $22162\frac{9^1}{3^8 7}$ |
| 66. | - | - | - | $1585\frac{1}{2}$ | 73. | - | - | - | $4134\frac{1}{2}$        |

74. - - -  $4\frac{1}{2}$  90.  $2\frac{1}{2} \div \frac{1}{2} = 2\frac{7}{11}$
75. - - -  $\frac{1}{2}$  91. - -  $33\frac{1}{2}$
76. - - -  $1\frac{1}{2}$  92. - -  $33\frac{1}{2}$
77. - - -  $\frac{1}{2}$  93. -  $19\frac{1}{2} = 19\frac{1}{2}$
78. - - -  $1\frac{1}{2}$  94. - -  $19\frac{1}{2}$
79. - - -  $1\frac{1}{2}$  95. - -  $104\frac{1}{2}$
80. - -  $2\frac{1}{2} = 2\frac{1}{2}$  96. - -  $104\frac{1}{2}$
81. -  $\frac{1}{2} = \frac{1}{2}$  97. - -  $67\frac{1}{2}$
82. -  $1\frac{1}{2} = 1\frac{1}{2}$  98. - -  $67\frac{1}{2}$  times
83. - -  $55\frac{1}{2}$  99. - -  $67\frac{1}{2}$
84. -  $7\frac{1}{2} = 7\frac{1}{2}$  100. - -  $4\frac{1}{2}$
85. - -  $173\frac{1}{2}$  101. - -  $4\frac{1}{2}$  times
86. - -  $216\frac{1}{2}$  102. - -  $4\frac{1}{2}$
87. -  $241\frac{1}{2} = 241\frac{1}{2}$  103. - -  $5\frac{1}{2}$
88.  $137\frac{1}{2} = 137\frac{1}{2}$  104. - -  $5\frac{1}{2}$  times
89.  $2\frac{1}{2} = 2\frac{1}{2}$  105. - -  $5\frac{1}{2}$
106. Cost \$210, gained \$42
107. First cost \$216. Gain \$27
108. Cost \$2884  $\frac{1}{2} = 2884.50$ . Gain \$961.50
109. \$1.50  $\frac{1}{2}$  per gall.
110. Cost  $266\frac{1}{2} = 266.92\frac{1}{2}$ . Gain \$80.07  $\frac{1}{2}$
111. Cost \$120  $\frac{1}{2} = 120.27\frac{1}{2}$ . Gain \$26.72  $\frac{1}{2}$
112. Gain \$2064  $\frac{1}{2} = 2064.04\frac{1}{2}$
113. Cost \$249  $\frac{1}{2} = 249.33\frac{1}{2}$ . Loss \$62.33  $\frac{1}{2}$
114. Cost \$294  $\frac{1}{2} = 294.85\frac{1}{2}$ . Loss \$36.85  $\frac{1}{2}$
115. Loss \$344  $\frac{1}{2} = 344.72\frac{1}{2}$
116. Whole loss \$16.80  $\frac{1}{2}$ . Loss per gall. \$0.08  $\frac{1}{2}$
117. Loss per yd. \$0.87  $\frac{1}{2}$
118. Cost \$150  $\frac{1}{2} = 150.50$
119. Cost \$248  $\frac{1}{2} = 248.18\frac{1}{2}$
120. He gained  $\frac{1}{10}$  of the cost, consequently he sold them for  $\frac{1}{10}$  of the cost. Divide by 112, and the quotient will be  $\frac{1}{10}$  of the cost. Or, which is generally better, multiply first by 100, and divide by 113, and you will

obtain the cost. Cost  $\$119\frac{3}{113} = 119.46\frac{1}{113}$ . Gained  $\$15.53\frac{1}{113}$

121. Gained  $\$1526\frac{1}{3} = \$1526.51\frac{1}{3}$

122. Cost  $\$1117\frac{1}{11} = 1117.04\frac{6}{11}$ . Loss  $\$134.04\frac{6}{11}$

123. Cost  $\$331.16$ . Loss  $\$82.79$

124. Cost  $669\frac{3}{13} = 669.23\frac{1}{13}$ . Sold them for  $\$756.23\frac{1}{13}$

125. Cost  $\$215$

126. Cost  $\$595\frac{1}{3} = 595.65\frac{2}{3}$ . Sold them for  $\$458.65\frac{2}{3}$

127. 40d. = 3s. 4d. per lb.

128.  $\$0.51\frac{1}{2}$  per gall.

*Note.* D gains 9 cents on a gallon, which is  $\frac{9}{33}$  of the cost; hence 20 cents is  $\frac{20}{33}$  of the cost of the brandy.

129. Age 66 years

*Note.*  $\frac{1}{2}$  and  $\frac{1}{3}$  are  $\frac{5}{6}$ , which added to his age makes  $\frac{1}{6}$ .

Hence 121 is  $\frac{1}{6}$  of his age.

130.  $\$216\frac{2}{3} = 216.66\frac{2}{3}$

131.  $\$950$

132.  $\$223.58\frac{1}{3}$

133.  $\$441.66\frac{2}{3}$

134.  $\$1077.77\frac{1}{3}$

135.  $\$358.18\frac{2}{11}$

136.  $\pounds 171\frac{3}{107} = \pounds 171$  Os.  $6\frac{72}{107}$  d.

137.  $\$114\frac{1}{4} = \$114$  16 $\frac{2}{3}$

138.  $\$270\frac{9}{13} = 270.75\frac{4}{13}$

139.  $\$822\frac{3}{103} = 822.33\frac{1}{103}$

140.  $\$96\frac{2}{13} = 96.15\frac{1}{13}$

141.  $\$0.33\frac{1}{3}$

142.  $\$23.22\frac{1}{3}$

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*Miscellaneous Examples, page 79.*

1. 2 sq. in.; 3 do.; 4 do.; 5 do. 7 do.

2. 8 sq. in. ; 16 do. ; 24 do. 32 do. ; 40 do. ; 64 do.
3. 2 sq. ft. ; 3 do. ; 5 do. ; 9 do. ; 15. do.
4. 9 sq. ft. ; 18 do. ; 27 do. ; 45 do. ; 63 do. ; 81 do.
5. 13 sq. in. ; 26 do. ; 39 do. ; 104 do.
6. 16 sq. ft. ; 32 do. ; 48 do. ; 80 do. ; 128 do. ; 208 do.
7. Multiply the length by the breadth
8. 234 sq. ft.
9. 13,871 sq. ft.
10. 196 sq. rods
11. 160 sq. rods
12.  $9\frac{1}{17}$  rods wide
13. 144 sq. in.
14. 18 in. in length
15. 9 sq. ft.
16.  $30\frac{1}{4}$  sq. yds.
17. 1296 sq. in.
18. 40 sq. rods
19. 4 roods
20. See Arithmetic, page 239
21. 39,204 sq. in.
22. 4840 sq. yds.
23. 6,272,640 sq. in.
24. 12 sq. ft.
25. 1 acre, 126 rods, or  $1\frac{3}{8}$  acre
26.  $32\frac{559394}{1773840}$  acres = 32 acres, 14 rods, 8 yds. 1 ft. 28 in.
27. 102,400 sq. rods
28. 640 acres
29. 126,720,000,000 acres
30. 1980 sq. in. ; 13 sq. ft. 108 in., or  $13\frac{1}{2}$  sq. ft.
31.  $110\frac{1}{16}$  acres
32.  $49\frac{41}{143}$  yds.
33. 2 cub. in. ; 3 do. ; &c. 8 do.
34. 12 cub. in. ; 24 do. ; &c. 96 do.



35. 4 cub. in.; 8 do.  
 36. 12 cub. in.; 24 do.; 36 do.  
 37. 80 cub. in.; 160 do.; 240 do.; 400 do.; 560 do.  
 38. 234 cub. in.; 1170 do.; 2574 do.  
 39. Multiply together the length, breadth, and thickness  
 40. 1728 cub. in.  
 41. 128 cub. ft.  
 42. See Arithmetic, page 239  
 43. 221,184 cub. in.  
 44. 86,400 cub. in.  
 45.  $271\frac{1}{8}\frac{3}{4}$  cub. ft.  
 46.  $23\frac{1}{3}\frac{1}{8}$  cub. ft.

*Note.* When one dimension is given in feet and the other two in inches, multiply the numbers together without reducing the feet to inches, and divide the product by 144, and the quotient will be the answer in cubic feet. If two dimensions are in feet and one in inches, multiply them together as they are, and divide the product by 12 to reduce it to feet. In the above example, if 28 feet be reduced to inches, the operation will stand thus

$$\begin{array}{r} 11 \times 11 \times 28 \times 12 \\ \hline 1728 \\ 11 \times 11 \times 28 \times 12 \\ \hline 144 \times 12 \end{array}$$

rejecting the 12 from the numerator and denominator, it becomes

$$\begin{array}{r} 11 \times 11 \times 28 \\ \hline 144 \end{array}$$

47.  $57\frac{7}{14}$  ft. = 1 ton  $7\frac{7}{14}$  ft.  
 48. 8 ft.  
 49. 345 cub. ft.  $21\frac{2}{14}$  feet of wood. 2 cords  $5\frac{2}{16}$  feet

## XXV.

*Decimal Fractions.*

1.	-	-	-	27.6	28.	-	-	-	1.043
2.	-	-	-	14.07	29.	-	-	-	17.0573
3.	-	-	-	123.008	30.	-	-	-	193.0047
4.	-	-	-	108.5	31.	-	-	-	87.00106
5.	-	-	-	73.09	32.	-	-	-	95.406
6.	-	-	-	4.006	33.	-	-	-	98.006004
7.	-	-	-	16.001	34.	-	-	-	.30507
8.	-	-	-	.6	35.	-	-	-	.0807
9.	-	-	-	.05	36.	-	-	-	$42\frac{5}{10} = 42\frac{1}{2}$
10.	-	-	-	.007	37.	-	-	-	$84\frac{1}{10} = 84\frac{1}{4}$
11.	-	-	-	.0002	38.	-	-	-	$9\frac{1}{10} = 9\frac{1}{2}$
12.	-	-	-	3.42	39.	-	-	-	$137\frac{4}{3}$
13.	-	-	-	$\frac{40}{100}$ or .40	40.	-	-	-	$25\frac{1}{2}$
14.	-	-	-	$\frac{42}{100}$ or .42	41.	-	-	-	$18\frac{1}{2}$
15.	-	-	-	$\frac{300}{1000}$ or .300	42.	-	-	-	$11\frac{321}{1000}$
16.	-	-	-	$\frac{80}{1000}$ or .080	43.	-	-	-	$163\frac{412}{1000}$
17.	-	-	-	$\frac{385}{1000}$ or .385	44.	-	-	-	$72\frac{13}{1000}$
18.	-	-	-	7.385	45.	-	-	-	$4\frac{1}{1000}$
19.	-	-	-	$\frac{2000}{10000}$ or .2000	46.	-	-	-	$13\frac{3002}{100000}$
20.	-	-	-	$\frac{500}{10000}$ or .0500	47.	-	-	-	$\frac{3}{4}$
21.	-	-	-	$\frac{60}{10000}$ or .0060	48.	-	-	-	$\frac{5}{16}$
22.	-	-	-	$\frac{2567}{10000}$ or .2567	49.	-	-	-	$\frac{3}{20}$
23.	-	-	-	.2567	50.	-	-	-	$\frac{4}{1123}$
24.	-	-	-	13.23	51.	-	-	-	$\frac{3}{20000}$
25.	-	-	-	21.182	52.	-	-	-	$\frac{53}{700000}$
26.	-	-	-	12.5736	53.	-	-	-	$\frac{300137}{7000000}$
27.	-	-	-	142.38746					

## XXVI.

1. \$22.295
2. 13.409 =  $13\frac{409}{1000}$  bu.
3. 75.975 =  $75\frac{975}{1000}$  cwt.
4. 759.77625 =  $759\frac{77625}{1000000}$  bu.
5. £16.365 =  $£16\frac{365}{1000}$
6. 8899.3799 =  $8899\frac{3799}{10000}$
7. 24.015 =  $24\frac{15}{1000}$  yds.
8. \$65.625
9. £155.245 =  $£155\frac{245}{1000}$
10. £2.428 =  $2\frac{428}{1000}$  = £2 8s. 6 $\frac{1}{2}$ d.
11. £95.775 =  $£95\frac{775}{1000}$
12. \$333.75
13. 468.8312 =  $468\frac{8312}{10000}$  lb.
14. 9.1372 =  $9\frac{1372}{10000}$  tons

## XXVII.

*Multiplication of Decimals.*

1.	.	.	\$87.15	12.	.	.	.0342
2.	.	.	\$63.00	13.	.	.	\$3
3.	.	.	61.18 bu.	14.	.	.	\$63
4.	.	.	194.8 cwt.	15.	.	.	\$36
5.	74.375	=	$74\frac{3}{8}$ cwt.	16.	.	.	\$58
6.	.	.	325.5 cwt.	17.	.	.	\$190
7.	.	.	1619.56	18.	.	.	\$351.50
8.	.	.	2338.911	19.	.	.	\$456
9.	.	.	808.868	20.	.	.	\$4283.40
10.	.	.	38.7555	21.	.	.	\$199.50
11.	.	.	12.528	22.	.	.	\$112.50

23.	-	-	64	45.	-	-	\$197.10
24.	-	-	214	46.	-	-	\$474.00625
25.	-	-	107	47.	-	-	\$1938.90
26.	-	-	713.769	48.	-	-	\$0.018
27.	-	-	713.769	49.	-	-	1.9665 cwt.
28.	-	-	15071	50.	-	-	10.35
29.	-	-	243.6	51.	-	-	18.802
30.	-	-	6058	52.	-	-	34.6
31.	-	-	41711.9491	53.	-	-	290.1186
32.	-	-	67418	54.	-	-	25.2885
33.	-	-	3393	55.	-	-	13.167392
34.	-	-	627120	56.	-	-	7.003215
35.	-	-	49552.25	57.	-	-	3.410904106
36.	-	-	667683.84	58.	-	-	.002012
37.	-	-	\$0.06	59.	-	-	.00030021
38.	-	-	.06	60.	-	-	.06
39.	-	-	.06	61.	-	-	.008
40.	-	-	\$0.36	62.	-	-	.00003
41.	-	-	\$0.70	63.	-	-	.00001
42.	-	-	\$1.62	64.	-	-	.000011021
43.	-	-	\$2.021	65.	-	-	1.344200769712
44.	-	-	\$39.738				

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*Miscellaneous Examples, page 87.*

1.	-	-	\$69	6.	-	-	\$77.832—
2.	-	-	\$946.875	7.	-	-	\$360.934+
3.	-	-	\$62.3656+	8.	-	-	\$401.899+
4.	-	-	\$57.145+	9.	-	-	\$655.717+
5.	-	-	\$39.918+	10.	-	-	\$481.384+
11.	3.696+	cwt.	17.351+	cwt.	4.1445+	cwt.	
12.	43.2777+	hhds.	0.24+	hhds.	7.01389—	hhds.	
13.	\$3.816+						

In the following examples, the nearest decimal will be given without the mark to show whether it is too large or too small.

14.	-	-	\$2.137	29.	-	-	.7879 rod
15.	-	-	\$2.391	30.	-	-	.1667 ft.
16.	-	-	\$17.973	31.	-	-	.5833 ft.
17.	-	-	\$129.594	32.	-	-	.4444 rod
18.	-	-	\$4.414	33.	-	-	.02434 mile
19.	-	-	.875 yd.	34.	-	-	£0.675
20.	-	-	.4375 yd.	35.	-	-	.4375s.
21.	-	-	.8125 lb.	36.	-	-	£0.574
22.	-	-	.6071 qr.	37.	-	-	See book.
23.	-	-	.475 qr.	38.	-	-	£7 14s. 11½d.
24.	-	-	.25 day	39.	-	-	£40 3s. 4d.
25.	-	-	.684 day	40.	-	-	£28 4s. 8½d.
26.	-	-	.5700 day	41.	-	-	£120 10s. 9½d.
27.	-	-	.7833 h.	42.	-	-	See book.
28.	-	-	.6464 h.				
43.	5½ = 5.4.      4 cwt. 3 qrs. 7 lbs. = 4.8125 cwt.						

These multiplied together produce 25.9875 cwt.

Reducing the fraction to quarters, pounds, &c.

$$\begin{array}{r}
 .9875 \\
 \underline{\phantom{0000}4} \\
 \hline
 \text{qrs. } 3.9500 \\
 \underline{\phantom{0000}28} \\
 \hline
 \phantom{\text{qrs. }} 760 \\
 \underline{\phantom{0000}190} \\
 \hline
 \text{lbs. } 26.60 \\
 \underline{\phantom{0000}18} \\
 \hline
 \text{oz. } 9.6
 \end{array}$$

Ans. 25 cwt. 3 qrs. 26 lb 9½ oz.

44. 25.90 $\frac{1}{2}$  cwt. = 25 cwt. 3 qrs. 17 lb. 3 $\frac{1}{2}$  oz.  
 45. 7s. 8d. 3 qrs.  
 46. 19s. 8d.  
 47. 2 qrs. 9 lb. 4 oz.  
 48. 25 lb. 12 oz.  
 49. 2 qrs. 26 lb. 7 oz.  
 50. 9d.  
 51. 10 lb. 12 oz.  
 52. 93.156 lb. = 93 lb. 2 oz.  
 53. 1124.16d.  
 54. 8 h. 18 min. 14 sec.  
 55. 35 min. 15 sec.  
 56. 3.5 ft. ; 4.25 ft. ; 7.75 ft. ; 3.66 + ft. ; 5.58 + ft. ;  
 9.833 + ft.  
 57. 4 in. 1.5 barley corn.  
 58. 67.4 sq. in.  
 59. 1458 in.  
 60. 11.43 sq. ft.  
 61. 281.94 sq. ft.  
 62. 29.72 sq. ft.  
 63. 30.4 ft.  
 64. 204 cub. ft.  
 65. See book.  
 66. \$95.078  
 67. \$89.171  
 68. Gained \$58.122.      Whole \$445.602.  
 69.        -      \$1331.25    75.        -        -      \$46.744  
 70.        -        -      \$25.966    76.        -        -      \$169.812  
 71.        -        -      \$118.343    77.        -        -      \$0.60  
 72.        -        -      \$384.12    78.        -        -      \$3.719  
 73.        -        -      \$95.452    79.        -        -      \$2.595  
 74.        -        -      \$2124.725    80.        -        -      \$12.85  
 81. { For 2 years, 12 per cent. = .12.  
       { For 3 years, 18 do. = .18.  
       { For 4 years, 24 do. = .24.

82.	{		For 6 months, 3 per cent. = .03	
	{		For 2 months, 1 do. = .01	
	{		For 4 months, 2 do. = .02	
	{		For 1 month, $\frac{1}{2}$ do. = .005	
	{		For 3 months, $1\frac{1}{2}$ do. = .015	
	{		For 5 months, $2\frac{1}{2}$ do. = .025	
	{		For 7 months, $3\frac{1}{2}$ do. = .035	
	{		For 8 months, 4 do. = .04	
	{		For 9 months, $4\frac{1}{2}$ do. = .045	
	{		For 10 months, 5 do. = .05	
	{		For 11 months, $5\frac{1}{2}$ do. = .055	
83.	{		For 13 months, $6\frac{1}{2}$ per cent. = .065	
	{		For 14 months, 7 do. = .07	
	{		For 17 months, $8\frac{1}{2}$ do. = .085	
84.	{		For 6 days, $\frac{1}{10}$ per cent. = .001	
	{		For 12 days, $\frac{2}{10}$ do. = .002	
	{		For 18 days, $\frac{3}{10}$ do. = .003	
	{		For 24 days, $\frac{4}{10}$ do. = .004	
	{		For 36 days, $\frac{6}{10}$ do. = .006	
	{		For 42 days, $\frac{7}{10}$ do. = .007	
	{		For 48 days, $\frac{8}{10}$ do. = .008	
	{		For 54 days, $\frac{9}{10}$ do. = .009	
85.	-	-	\$0.472	91. - - \$0.703
86.	-	-	\$0.544	92. - - \$0.426
87.	-	-	\$4.439	93 - - \$0.197
88.	-	-	\$3.515	94. - - \$0.832
89.	-	-	\$17.026	95. - - \$1.53
90.	-	-	\$4.273	96. - - \$20.966
97.	6 months is 3 per cent. = .03. Then 1 month and 15 days are 45 days, which, divided by 6, gives .0075. The rate is .0375. Ans. \$4.33.			
98.	\$30.37			
99.	\$13.93			
100.	\$409.43			

101. \$1085.073  
 102. Interest \$62.91      Due \$596.91  
 103. \$15.70  
 104. See book  
 105. 15s. = £0.75 ; 3d. 2 qrs. = 14 farthings ; adding 1 because the number is greater than 12, it may be called £0.015. The whole is £13.765. The rate for 1 year and 6 months is .09
- 13.765  
 .09
- 

Ans. £1.23885

The .2 = 4s. The rest of the fraction is nearly .039. Taking 2 from this, because the number is greater than 36, we have 37 farthings, which are 9d. 1 qr. Ans. £1 4s. 9½d.

106. 4s. 4½d.  
 107. £34 7s. 11d.  
 108. £4 18s. 4d.  
 109. £1 5s. 4½d.  
 110. 2s. 6d. 2qr.  
 111. 2d.  
 112. £7 3s. 7½d.  
 113. £42 11s. 3½d.

---

## XXVIII.

### *Division of Decimals.*

1.	-	-	\$3.75	4.	-	-	1.5 bbl.
2.	-	-	\$5.781	5.	-	-	1.406 bu.
3.	-	-	\$36.715	6.	-	-	4.899 miles.



7.	-	-	£1 8s. 3½d.	41.	-	-	\$4.148
8.	-	-	£83 11s. 1d.	42.	-	-	9s. 1½d.
9.	-	-	6.172	43.	-	-	\$2.50
10.	-	-	34.326	44.	-	-	\$22.857
11.	-	-	.352	45.	37.825s. =	£1 17s. 10d.	
12.	-	-	2.871	46.	379.562s. =	£18 19s. 6½d	
13.	-	-	3.4617	47.	-	-	13.846 times
14.	-	-	28.903	48.	-	-	12 times
15.	-	-	1.4038	49.	-	-	37.895
16.	-	-	4618	50.	-	-	297.771
17.	-	-	.09226	51.	-	-	2.567
18.	-	-	.02634	52.	-	-	10.204
19.	-	-	.00413	53.	-	-	3.627
20.	-	-	.0258	54.	-	-	10
21.	-	-	.03077	55.	-	-	100
22.	-	-	.00128	56.	-	-	61.538
23.	-	-	.00007	57.	-	-	44.156
24.	-	-	.0005765	58.	-	-	687.1345
25.	-	-	.0001006	59.	-	-	530000
26.	-	-	27 galls.	60.	-	-	254000
27.	-	-	70.6 bu.	61.	-	-	10
28.	-	-	Omitted in Book	62.	-	-	100
29.	-	-	18.18 lb.	63.	-	-	61.538
30.	-	-	166.7 lemons	64.	-	-	44.156
31.	-	-	21.7 coats	65.	-	-	687.1345
32.	-	-	17.7 acres	66.	-	-	530000
33.	-	-	10.56 acres	67.	-	-	254000
34.	-	-	15.41 hours	68.	-	-	19142.857
35.	-	-	43.333 days	69.	-	-	19142.857
36.	-	-	38.87 days	70.	-	-	35.862
37.	-	-	43.69 galls.	71.	-	-	2.802
38.	-	-	\$2.80	72.	-	-	16.6113
39.	-	-	\$6.667	73.	-	-	.8337
40.	-	-	\$8.364	74.	-	-	.887

75.	-	-	.517	109.	-	-	9.821 lb.
76.	-	-	.517	110.	-	-	\$6.30
77.	-	-	.46	111.	£6.484	=	£6 9s. 8½d.
78.	-	-	.46	112.	-	-	17.918 bu.
79.	-	-	.1905	113.	-	-	6s. 8½d.
80.	-	-	.1905	114.	-	-	£1 2s. 4d.
81.	-	-	20	115.	-	-	£29 1s. 2½d.
82.	-	-	156.627	116.	-	-	6.583
83.	-	-	6320.896	116.	-	-	42.173
84.	-	-	124.031	117.	-	-	352.46
85.	-	-	408.163	118.	-	-	754.26
86.	-	-	177.211	119.	-	-	1.28255
87.	-	-	15700000	120.	-	-	783.57
88.	-	-	20.473 galls.	121.	-	-	14.6934
89.	-	-	2.43 galls.	122.	-	-	.9957
90.	-	-	5.324 galls.	123.	-	-	28.308
91.	-	-	14.942 bbls.	124.	-	-	28.308
92.	-	-	\$6.765	125.	-	-	99.314
93.	£0.781	=	15s. 7½d.	126.	-	-	99.314
94.	-	-	\$6.355	127.	-	-	.10837
95.	-	-	\$96.72	128.	-	-	.003002
96.	-	-	3.105 times	129.	-	-	$\frac{1757}{1423}$
97.	-	-	382.718	130.	-	-	$\frac{3756}{3873}$
98.	-	-	17.549	131.	-	-	$\frac{6378}{5288} = \frac{3125}{1788}$
99.	-	-	22.321	132.	-	-	$\frac{3440}{3786} = \frac{1725}{1578}$
100.	-	-	22.321	133.	-	-	$\frac{16487}{23780}$
101.	-	-	100	134.	-	-	$\frac{1134500}{214784} = \frac{283625}{53691}$
102.	-	-	100	135.	-	-	$\frac{7384}{3700} = \frac{1846}{925}$
103.	-	-	5	136.	-	-	$\frac{7}{506}$
104.	-	-	5	137.	-	-	$\frac{647387}{2300}$
105.	-	-	1	138.	-	-	$\frac{53000}{67}$
106.	-	-	1	139.	-	-	$\frac{309}{1}$
107.	-	-	13.27	140.	-	-	$\frac{35}{78}$
108.	-	-	3.598	141.	-	-	$\frac{1318}{1786} = \frac{172}{223}$

142.

$$\frac{70327}{439500}$$

143.

$$\frac{1506449}{8941713}$$

*Miscellaneous Examples, page 101.*

1. \$70.269
2. \$122.784
3. \$8.192
4. \$206.328
5. 1.417 cwt.
6. £43 11s. 1½d.
7. 38.727 oz. =  $38\frac{8}{11}$  oz.
8. 10.383 ft.
9. 5.1 yds.
10. .00517 of a guinea = 13d.\*
11. 43.976 days
12. 126.727 days
13. 272.875 sq. ft.; 8 sq. ft.; 34.11 yds.
14. 39.48 yds.
15. 3117.56 ft.      \$10.911
16. 860.2 ft.
17. 10.72556 bunches
18. 7.667 acres
19. \$225.075
20. 3 cords
21. 2 ft. 8 in. =  $3.666 + \text{ft.}$

$$\begin{array}{r} 3.666 + \\ 4 \end{array}$$

---


$$14.664 + (2$$

Ans. 7.33 ft. of wood.

\* In this example, instead of .075 of a guinea, read .75 of a guinea.

In this I multiply the height and breadth together, and then, instead of multiplying by 8 and dividing by 16, I divide at first by 2.

22. 4.3 ft. of wood

23. 9.23 ft. of wood.

24. 1.39 cord, or 1 cord, 3.1 ft.

25. 4.45 ft. = 4 ft. 5.4 in.

26. 70848 bricks

27. £141 12s. 11½d.

28. \$34.59

29. \$33.734

30. £95 1s. 0¾d.

31. 6145.88(153647

6145.88 ———

———— \$0.04 on a dollar

Ans. \$939.027

32. The tax on \$1 is \$0.0339.      Ans. \$87.23

33. .2855 = 28.55 per cent.

34. He gained  $\frac{5}{20}$  of the first cost, which is .25 or 25 per cent.

35. .044 = 4.4 per cent.

36. .11 = 11 per cent.

37. 1s. 8d. = 20d.      2s. 3d. = 27d.      He gained 7d.  
which is  $\frac{7}{20}$  of the first cost.       $\frac{7}{20} = .35$  or 35 per cent.

38. .137 = 13.7 per cent.

39. 15.3 per cent.

40. 18.6 per cent.

41. He can pay  $\frac{1347119}{1913743}$  of the whole debt. This reduced to a decimal is .704 —      Ans. 70.4 per cent. nearly

42. The whole discount was \$11.40, which is  $\frac{114}{100} = .2$   
Ans. 20 per cent.

43. The whole interest was \$5.22, which is  $\frac{522}{1000}$  of the

principal. This reduced to a decimal is .06. Ans. 6 per cent.

44. He paid \$12.81 for 2 years, which is \$6.405 for 1 year.

$$\frac{6.405}{18\frac{2}{3}} = .035. \quad \text{Ans. } 3\frac{1}{2} \text{ per cent.}$$

45. Find how much he paid for 1 year, and then find the rate as above. Ans.  $6\frac{1}{2}$  per cent. nearly

46.  $.0452 = 4\frac{5}{100}$  per cent.

47. Since 4s. 6d. is equal to 9 sixpences, and £1 is equal to 40 sixpences

$$\frac{40}{9}$$

$$\text{Ans. } \$4.444 +$$

48. Reduce the £35 to sixpences and divide by 9; or multiply \$4.444 + by 35. If there are shillings and pence, they must be reduced to decimals. Ans. \$155.555

49. £27 14s. 8d. = £27.733 or £27.733

$$4.444$$

$$40$$

$$\begin{array}{r} 110932 \\ \hline 110932 \\ \hline 110932 \\ \hline 110932 \end{array}$$

$$11.09320(9)$$

$$110932$$

$$\$123.258$$

$$110932$$

$$\$123.245452$$

The latter method is shorter and more exact.

50. \$834.964 +

51. Multiply by 9 to reduce it to English sixpences, and then divide by 40, the number of sixpences in £1; or divide \$19.42 by \$4.444. Ans. £4.369 = £4 7s. 4½d.

52. £35.325 = £35 6s. 6d.

53. £536 11s. 3d.

54. Cost \$680.30      Sold \$761.94

55.	-	-	\$5.386 +	65.	-	-	\$0.00291
56.	-	-	\$5.80	66.	-	-	\$0.00068
57.	-	-	\$12.848	67.	-	-	\$0.002177 +
58.	-	-	\$6.517	68.	-	-	\$0.06372
59.	-	-	\$16.387	69.	-	-	7s. 6 $\frac{1}{2}$ d.
60.	-	-	£11 9s. 0 $\frac{1}{2}$ d.	70.	-	-	3 $\frac{1}{2}$ d.
61.	-	-	£19 5s. 2d	71.	-	-	6s. 6 $\frac{1}{2}$ d.
62.	-	-	£2 15s. 1d.	72.	-	-	5s. 10 $\frac{1}{2}$ d.
63.	-	-	£21 18s. 1 $\frac{1}{2}$ d.	73.	-	-	\$564.08
64.	-	-	\$127.133 +	74.	-	-	\$1132.90

In examples like the two last, some compute the interest on the whole sum to the time of the first payment and add it to the principal, and then deduct the payment; then they compute the interest on the remainder to the time of the second payment, and add it to the principal, and deduct the payment again; and so on. This is not a just method, if simple interest only is allowed, for if the payments were made annually, it would be compound interest; and if they were made oftener, it would be more than compound interest.

*Just, or not, it is the mode which the Laws of Massachusetts say shall be used.*

Answers to the examples in Circulating Decimals, page 209 and 210.

$$.555 \&c. = \frac{5}{9}$$

$$.666 \&c. = \frac{2}{3} = \frac{4}{6}$$

$$.777 \&c. = \frac{7}{9}$$

$$.888 \&c. = \frac{8}{9}$$

$$.999 \&c. = \frac{9}{9} = 1.$$

$$.533 \&c. = \frac{5}{10} + \frac{3}{100} = \frac{53}{100} = \frac{53}{100}$$

$$.466 \&c. = \frac{4}{10} + \frac{6}{100} = \frac{46}{100} = \frac{23}{50}$$

$$.388 \&c. = \frac{388}{1000}$$

$$.3744 \&c. = \frac{3744}{10000} + \frac{4}{10000} = \frac{3748}{10000}$$

5 \*

$$.46355 \text{ \&c.} = \frac{463}{10000} + \frac{5}{100000} = \frac{4635}{100000}$$

$$.24 = \frac{24}{100} = \frac{6}{25}$$

$$.42 = \frac{42}{100} = \frac{21}{50}$$

$$.537 = \frac{537}{1000} = \frac{537}{1000}$$

$$.4745 = \frac{4745}{10000} = \frac{4745}{10000}$$

$$.8374 = \frac{8374}{10000}$$

$$.47647 = \frac{47647}{100000} = \frac{47647}{100000}$$

*Miscellaneous Examples, page 211.*

- |    |   |   |         |    |   |   |           |
|----|---|---|---------|----|---|---|-----------|
| 1. | - | - | 1s. 4d. | 5. | - | - | 3s. 2d.   |
| 2. | - | - | 4s. 3d. | 6. | - | - | £1 12s.   |
| 3. | - | - | 11d.    | 7. | - | - | 15s. 2d.  |
| 4. | - | - | 3s. 2d. | 8. | - | - | 17s. 10d. |
9. 4s. 5d.
10. £1 6s. 1d.
11. £12 9s. 9d.
12. £2 12s. 3½d.
13. 2 cwt. 1 qr. 21 lb.
14. £2 13s. 8½d.
15. 2 cwt. 3 qrs. 24½ lb.
16. 2 cwt. 1 qr. 9½ lb.
17. 46 galls. 1½ qt.
18. { 1 coat      1 yd. 3 qrs. 1½nl.  
      { 13 coats    23 yds. 3qrs. 2½ nls.
19. £65 3s. 4d.
20. £17 1s. 1½d.
21. In this example, I first multiply by  $54 = 6 \times 9$ , and then subtract  $\frac{1}{2}$  of £56 9s. 7d. from the product. I then divide the whole by  $18 = 3 \times 6$

Part II.

Key.

$$\begin{array}{r}
 \begin{array}{r}
 \text{£} \quad \text{s.} \quad \text{d.} \\
 56 \quad 13 \quad 8 \\
 \phantom{00} \phantom{00} 9 \\
 \hline
 510 \quad 3 \quad 0 \\
 \phantom{00} \phantom{00} 6 \\
 \hline
 3060 \quad 18 \quad 0 \\
 -11 \quad 6 \quad 8\frac{2}{3} = \frac{1}{3} \text{ of } \text{£}56, \text{ \&c.} \\
 \hline
 3049 \quad 11 \quad 3\frac{1}{3}(6 \\
 \hline
 508 \quad 5 \quad 2\frac{1}{3}(3
 \end{array}
 \end{array}$$

£169 , 8s.  $4\frac{1}{3}$ d. Ans.

22. £1650 18s. 5d.
23. £5 8s.  $0\frac{2}{3}$ d.
24. £3 0s.  $2\frac{1}{3}$ d.
25. £39 11s.  $2\frac{2}{3}$ d.
26.  $163\frac{1}{2}$  ft.
27. 17h. 12 min.
28.  $11\frac{1}{2}$  days.
29. They meet on the next day after their departure at 9h.  $50\frac{1}{2}$  min. morn. The distance from Boston  $127\frac{1}{2}$  miles, and from New York  $122\frac{1}{2}$  miles.
30. A  $17\frac{1}{2}$ . B  $14\frac{1}{2}$
31.  $11\frac{1}{2}$  oz.
32. 390 men
33. 10 days
34.  $15\frac{1}{2}$  oz.
35.  $4\frac{1}{2}$  yds.
36.  $9\frac{1}{4}$  months
37.  $4166\frac{2}{3}$  yds. of shalloon
38.  $202\frac{1}{2}$  quarters.



39. 20 men
40. If 7 men can build 36 rods in 3 days, they can build 12 rods in 1 day, and 168 rods in 14 days. If 7 men can build 168 rods, 20 men can build 480 rods in the same time. Ans. 480 rods.
41.  $19\frac{2}{3}$  bushels
42. \$125.917+
43. In questions like this and some of the preceding, where there are several conditions, it is necessary to take one condition at a time, and solve the question with regard to each separately.

If 18 men can build a piece of wall in 15 days, how many days will it take 20 men to build the same wall? It would take them  $13\frac{1}{2}$  days.—If 20 men can build 40 rods of wall in  $13\frac{1}{2}$  days, how long will it take them to build 87 rods of the same kind? It would take them  $29\frac{2}{3}$  days.—If 20 men can build 87 rods of wall 5 feet high in  $29\frac{2}{3}$  days, how long will it take them to build the same number of rods 8 ft. high? It would take them  $46\frac{4}{5}$  days.—If 20 men can build a wall 4 feet thick in  $46\frac{4}{5}$  days, how many days will it take to build one 5 ft. thick? It will take them  $58\frac{2}{5}$  days.

It is, however, less trouble to represent the several conditions as follows :

The first condition is with regard to the number of men. 20 men will do it in  $\frac{1}{2}$  of the time that 18 men would do it.

This may be represented thus,  $\frac{15 \times 18}{20}$ . It would take  $\frac{1}{2}$

as long on account of the length; this is expressed thus,

$\frac{15 \times 18 \times 87}{20 \times 40}$ . It would take  $\frac{8}{5}$  as long, on account of the

height. This is expressed thus,  $\frac{15 \times 18 \times 87 \times 8}{20 \times 40 \times 5}$ . It

would take  $\frac{1}{4}$  as long, on account of the thickness. This is

expressed thus,  $\frac{15 \times 18 \times 87 \times 8 \times 5}{20 \times 40 \times 5 \times 4}$

This may be reduced before the operation is performed; the 15 in the numerator and 20 in the denominator are divisible by 5; 18 and 4 are divisible by 2; 5 and 5 are divisible by 5; 8 and 40 are divisible by 8. Performing these divisions,

the fraction becomes  $\frac{3 \times 9 \times 87 \times 1 \times 1}{4 \times 5 \times 1 \times 2}$ .

Multiplying the numbers, the numerator becomes 2349, and the denominator 40, and the fraction stands thus  $2\frac{349}{40} = 58\frac{19}{40}$  as before. Ans.  $58\frac{19}{40}$  days.

44. \$948.88 $\frac{2}{3}$

45. 2808 quarters

46. 168 tailors

47. 60 measures

48. 432 tiles

49. 160632 bricks

50. 14400 shingles

51. 994 ft.

52. \$51.10 $\frac{1}{4}$

53. \$0.505 —

54. \$13.09

55. \$23.83

56. The gain was \$10.49. It is nearly  $2\frac{4}{10}$  per cent.  
on \$437.45

57. \$29.99

58. See book.

59.

Yrs.	5 rates	6	Yrs.	5 rates	6
1	1.05000	1.06000	11	1.71034	1.89830
2	1.10250	1.12360	12	1.79585	2.01220
3	1.15762	1.19102	13	1.88565	2.13293
4	1.21551	1.26248	14	1.97993	2.26090
5	1.27628	1.33822	15	2.07893	2.39656
6	1.34009	1.41852	16	2.18287	2.54035
7	1.40710	1.50363	17	2.29202	2.69277
8	1.47745	1.59385	18	2.40662	2.85434
9	1.55132	1.68948	19	2.52695	3.02560
10	1.62889	1.79085	20	2.65329	3.20713

60. \$2.322

61. \$94.35

62. \$1179.915

63. 1135.88

64. \$1753 +. The principal is doubled in 11 years, 10 months, and between 21 and 22 days.

65. To answer this question, the best way is to find the amount of the whole sum for the whole time, and then to find what each of the payments would amount to from the time they were made, until the 8th of July, 1822; and deduct them from the whole amount. Ans. \$846.247.

66. The amount of £1 for 5 years, at six per cent. according to the table, is £1.33822; computing the interest on this for 3 months, and adding it, it amounts to £1.35829. £17 13s. 6d. = £17.675.

$$1.35829 \times 17.675 = 24.008 -$$

Ans. £24 0s. 2d.

67	-	-	\$282.875	72.	-	-	\$0 75 $\frac{2}{3}$
68.	-	-	£229 9s. 6d.	73.	-	-	53 $\frac{1}{2}$ galls.
69.	-	-	\$0.47	74.	-	-	19 $\frac{1}{3}$ galls.
70.	-	-	\$0.094 $\frac{4}{13}$	75.	-	-	See book
71.	-	-	\$1.484 $\frac{3}{13}$	76.	-	-	See book

77. See book

78. 10 galls. of the cheaper to 25 of the dearer; or 2 of the cheaper to 5 of the dearer

79. 5 lb. at 10 cents, 2 lb. at 13 cents, and 2 lb. at 16 cents

80. 2 parts water to 13 of rum

81. 6 " at 9s., 1 at 7s., 1 at 5s., and 3 of water

Or 1 part at 9s., 6 at 7s., 3 at 5s., and 1 of water

Or 6 parts at 9s., 6 at 7s., 3 at 5s., and 4 of water

Or 6 " at 9s., 7 at 7s., 1 at 5s., and 4 of water

82. See book

83. 20 bu. of barley, and 61  $\frac{2}{11}$  of oats

84. 32  $\frac{1}{2}$  galls.

85.  $\left\{ \begin{array}{l} \text{A's loss } 80\frac{14}{11} \text{ tons} \\ \text{B's loss } 54\frac{28}{11} \text{ tons} \\ \text{C's loss } 15\frac{45}{11} \text{ tons} \end{array} \right.$

86. These fractions reduced to a common denominator are  $\frac{30}{110}$ ,  $\frac{20}{110}$ ,  $\frac{15}{110}$ , and  $\frac{12}{110}$ . Rejecting the denominators, the numerators show the proportions. The sum of the numerators is 77.

The wife's share is  $\frac{30}{77}$  of the whole sum = \$4675.32  $\frac{4}{11}$

The eldest son's share  $\frac{20}{77}$  = \$3116.88  $\frac{4}{11}$

The second son's "  $\frac{15}{77}$  = 2337.66  $\frac{8}{11}$

The daughter's "  $\frac{12}{77}$  = 1870.12  $\frac{6}{11}$

In this example much labour may be saved after finding the wife's share, by observing that the eldest son's share is  $\frac{2}{3}$  of the wife's share, the second son's  $\frac{1}{2}$  of it, and the daughter's  $\frac{2}{3}$  of it.

- |      |   |                                 |                         |  |
|------|---|---------------------------------|-------------------------|--|
| 87.  | { | A should pay                    | \$16.44 $\frac{1}{2}$   |  |
|      | { | B       "                       | \$20.55 $\frac{1}{2}$   |  |
| 88.  | { | A's share                       | \$116.66 $\frac{2}{3}$  |  |
|      | { | B's     "                       | \$133.33 $\frac{1}{3}$  |  |
| 89.  | { | A 1 guinea, 15s.                | 6 $\frac{54}{1047}$ d.  |  |
|      | { | B 2 guineas, 8s.                | 6 $\frac{568}{1047}$ d. |  |
|      | { | C 5 guineas, 5s.                | 3 $\frac{819}{1047}$ d. |  |
|      | { | D 10 guineas, 12s.              | 7 $\frac{663}{1047}$ d. |  |
| 90.* | { | One of the 1st class should pay | \$39.09                 |  |
|      | { | 2d                   "          | 12.167                  |  |
|      | { | 3d                   "          | 8.046                   |  |
|      | { | 4th                  "          | 4.841                   |  |
|      | { | 5th                  "          | 2.219                   |  |

- 91. To find A's proportion,**
- |      |   |   |   |      |
|------|---|---|---|------|
| £150 | × | 7 | = | 1050 |
| £100 | × | 5 | = | 500  |
| £270 | × | 6 | = | 1620 |

**3170 = A's proportion**

**In the same manner find the proportions of B and C.**

**A = 3170**

**B = 3770**

**C = 8560**

**15500**

**They must share the gain as follows :**

A  $\frac{3170}{15408}$  of it = £92 0s. 7½d.

B  $\frac{3770}{17800}$  " = £109 9s. 0 $\frac{1}{2}$ d.

$$C \frac{8560}{18500} = £248 \text{ 10s. 4d.}$$

92. *Rule for Compound Fellowship.* Multiply each man's stock by the time it is employed; each of these pro-

\* This answer is what each should pay for the whole time. First find the price of 14 weeks, and divide between the 10; then of 3 weeks and divide by 14, &c

ducts being made the numerator of a fraction, of which their sum is the denominator, will express each man's proportion of the stock to be divided.

93.	-	-	15 months	103.	-	$5\frac{1}{12}$ months
94.	-	-	24 months	104.	-	- 8 months
95.	-	-	120 months	105.	-	- 6 months
96.	-	-	1738 months	106.	-	- 8 months
97.	-	-	8 months	107.	-	$4\frac{1}{2}$ months
98.	-	-	$5\frac{1}{4}$ months	108.	-	- \$723.488
99.	-	-	16 months	109.	-	- \$691.542
100.	-	-	3 months	110.	-	- \$151.06
101.	-	-	$7\frac{1}{2}$ months	111.	-	- \$11.276
102.	-	-	$38\frac{1}{6}$ months	112.	-	- \$79.064

113. \$560.173

114. A's \$15.      B's \$35

115. { Son's share \$5468.75  
       { Wife's " 7031.25

116. 3 h. 45 min. morn.

117. 45 and 50

118.  $2\frac{1}{2}$  days

119.  $1\frac{1}{2}$  day

120. The first could build  $\frac{1}{4}$  of it in a day, the second  $\frac{1}{6}$ , and the third  $\frac{1}{12}$  of it. They would altogether do  $\frac{3}{4}$  of it in a day; and it would take them  $3\frac{2}{3}$  days to do the whole. Ans.  $3\frac{2}{3}$  days

121. They both together consumed  $\frac{1}{12}$  of it in a day; the woman alone consumed  $\frac{1}{24}$  in a day; the man alone consumed the difference between  $\frac{1}{12}$  and  $\frac{1}{24}$ , which is  $\frac{1}{24}$ . It would last the man alone  $33\frac{1}{2}$  days

122.  $1\frac{1}{2}$  week

123. 1 h. 59 min.  $37\frac{1}{2}$  sec.

124. 9 and 16

125. { The elder had \$8750  
       { The younger \$6250

126. { Wife's share \$18833.33 $\frac{1}{4}$   
 { Son's " \$17333.33 $\frac{1}{4}$   
 { Daughter's \$13833.33 $\frac{1}{4}$

127. Take out \$500, and then A's share will be equal to B's: add \$300, and C's share will be equal to B. Divide this into three equal parts, and one of the parts will be equal to B's share. Having B's share, it will be easy to find the others

- { A's share \$12100  
 { B's " 11600  
 { C's " 11300
128. { Sheep \$8  
 { Cow \$18  
 { Ox \$36
129. { 12 calves  
 { 6 sheep

130. 7 oxen, 14 cows, 42 sheep

131. Rye 5s. ; wheat 8s. per bushel

132. The tallow and hide came to \$7.99 ; this subtracted from \$50 leaves \$42.01 for the value of the meat. The hind quarters together weighed 440 lb. ; at  $\frac{1}{4}$  a cent per lb. they would come to \$2.20. This subtracted from 42.01 leaves \$39.81. If this be divided by 873, the weight of all the quarters, it gives \$0.0456 nearly, which is the price per lb. of the fore quarters. The hind quarters are  $\frac{1}{4}$  cent per lb. more, which is \$0.0506

Price of A's quarter \$10.9802

" B's " 11.2838

" C's " 9.7584

" D's " 9.9864

133. A's quarter at 6 $\frac{1}{4}$  cents per lb. comes to \$14.105 ; B's to \$14.495 ; C's, at 6 cents, comes to \$12.84 ; D's to \$13.14. The sum of these is \$54.58. A must pay  $\frac{1}{4}$

of \$42.01; B  $\frac{1}{4}$ ; C  $\frac{1}{4}$ ; D  $\frac{1}{4}$ —A's share is \$10.857; B's \$11.156; C's \$9.883; and D's \$10.114.

134. The horse is worth 9 parts, and the saddle 1 part of \$150. That is, the horse is worth  $\frac{9}{10}$ , and the saddle  $\frac{1}{10}$  of it. Ans. Horse \$135, the saddle \$15

135. There are 9 cattle to 20 sheep.  $\frac{9}{29}$  of the whole are cattle, and  $\frac{20}{29}$  sheep. Ans. 54 cattle, and 120 sheep

136. To 1 ox, there were 3 cows and 6 sheep.  $\frac{1}{10}$  of them were oxen,  $\frac{3}{10}$  cows, and  $\frac{6}{10}$  sheep. Ans. 8 oxen, 24 cows, 48 sheep

137. Say the fourth has 2 parts, the third 3 parts, the second 5 parts, and the first 10 parts; then the fourth will have  $\frac{2}{20}$  of the whole, the third  $\frac{3}{20}$ , the second  $\frac{5}{20}$ , and the first  $\frac{10}{20}$ . Ans. The share of the first is \$6500; of the second \$3250; of the third \$1950; and of the fourth \$1300

138. Since B is to have 15 crowns more than A, take out 15 for B, and they have equal shares in the remainder. C is to have  $\frac{1}{2}$  of both their sums added together, that is,  $\frac{1}{2}$  of twice the share of A, and  $\frac{1}{2}$  of 15 besides. Take out  $\frac{1}{2}$  of 15, which is 3, and then he is to have of the remainder  $\frac{1}{2}$  of what A and B have of it. 15 and 3, which is 18, taken from 324 leave 306; of this say A and B together are to have 5 parts and C 1 part; that is, A and B together are to have  $\frac{4}{5}$  and C  $\frac{1}{5}$  of 306 crowns.  $\frac{4}{5}$  of 306 is 51, and  $\frac{1}{5}$  is 255.  $\frac{1}{2}$  of 255 is 127 $\frac{1}{2}$ ; this is A's share; 15 added to this makes 142 $\frac{1}{2}$ ; this is B's share. 3 added to 51 makes 54; this is C's share. Ans. A took 127 $\frac{1}{2}$  crowns, B 142 $\frac{1}{2}$ , and C 54

139. Each person owns  $\frac{4}{33}$  of the whole. A sold  $\frac{1}{33}$  and had  $\frac{1}{33}$  left. B sells 2 of his shares, which are divided equally among the other shares; there are now only 30 shares, and they are equal as before; therefore A owns  $\frac{1}{30}$  of the whole

140. C took  $\frac{1}{3}$ , that is,  $\frac{2}{3}$  of the whole gain; therefore he must have put in  $\frac{2}{3}$  of the whole stock, and A and B



gether  $\frac{3}{4}$ . A and B together put in \$115; this is  $\frac{3}{4}$  of \$160, which is the whole stock; of this C put in \$45

141. See book

142. 1 cord, 1 ft. 1' 8"

143. 306 ft. 11' 4"

144. 2 cords, 5 ft. 7' 5"

145. \$1.203125

146. See book

147.  $\frac{3}{4} = \frac{8}{12}$ , and  $\frac{1}{2} = \frac{6}{12}$ ; their ages are to each other in the proportion of 8 and 9; that is, the age of the younger is  $\frac{8}{9}$  of the age of the elder; therefore 10 must be  $\frac{1}{9}$  of the age of the elder. Ans. Younger 80, and the elder 90 years.

148. Observe that the third had  $\frac{1}{2}$  as much as the first. The second had as much as the third and fourth, that is,  $\frac{1}{2}$  as much as the first, and 5 cents; the first had as much as the second and fourth, that is,  $\frac{1}{2}$  of the first, and 5 cents, and 5 cents again; or  $\frac{1}{2}$  of itself and 10 cents. Therefore 10 cents is  $\frac{1}{2}$  of the first. Ans. The first had 20 cents, the second 15, the third 10, and the fourth 5

149.  $\frac{1}{4}$  of A's and  $\frac{1}{3}$  of B's are equal to 13; multiplying by 4,  $\frac{4}{3} = \frac{2}{3}$  of A's and once B's are equal to 52. Again,  $\frac{1}{3}$  of A's and  $\frac{1}{2}$  of B's are equal to 16; multiplying by 2,  $\frac{2}{3} = \frac{1}{3}$  of A's and once B's are equal to 32. 20 then is the difference between  $\frac{1}{4}$  and  $\frac{1}{3}$  of A's age. The difference between  $\frac{1}{4}$  and  $\frac{1}{3}$  is  $\frac{1}{12}$ . 20 is  $\frac{1}{12}$  of 48, the age of A.  $\frac{1}{4}$  of 48 is 12. 12 and 5 are 17; therefore 5 is  $\frac{1}{4}$  of B's age. Ans. A's age 48 years; B's 20

150. Both together were \$400;  $\frac{1}{4}$  of the first, and  $\frac{1}{3}$  of the second were \$120; multiplying by 3,  $\frac{3}{4}$  of the first and once the second together were equal to \$360; taking this from \$400, there remains 40 for  $\frac{1}{4}$  of the first. Ans. First \$160, and the second \$240

151. The whole of the money of the second, and  $\frac{1}{3}$  of that of the first is \$4200; multiply the first condition by 3,

the whole of the money of the second, and three times that of the first is \$12600; taking \$4200 from this, there remains \$8400; this is the difference between  $\frac{1}{3}$  of the first and three times the first; that is,  $\frac{1}{3}$  of the first. \$8400 is  $\frac{1}{3}$  of \$3000, which is the money of the first. Ans. The first had \$3000, and the second \$3600

152. He bought 4 at 2 cents each, as often as he bought 3 at 3 cents each. 4 at 2 cents came to 8 cents, and 3 at 3 cents came to 9 cents; therefore every 7 lemons cost 17 cents, which is  $2\frac{3}{7}$  cents each. He sold them at  $2\frac{1}{2}$  cents each. The difference between  $2\frac{3}{7}$  and  $2\frac{1}{2}$  is  $\frac{1}{14}$ . He gained  $\frac{1}{14}$  of a cent on each lemon, that is 1 cent on 14 lemons. To gain 25 cents, he must have had 25 times 14 lemons.  $\frac{4}{7}$  of them cost 2 cents, and  $\frac{3}{7}$  cost 3 cents each. Ans. 350 lemons

153.  $8\frac{1}{2}$  barrels

154. He received five times as much as he spent, and then he had 200 dollars; if he had received as much as he spent, he would have had as much as he had at first, viz. \$100. The other \$100 then must be four times what he spent. Ans. \$25

155. Each son had  $\frac{1}{2}$  of the whole estate, and each daughter  $\frac{1}{4}$  of it. The two sons together had  $\frac{1}{2}$ , and the three daughters  $\frac{3}{4}$ ; the difference is  $\frac{1}{4}$ . \$1000 therefore is  $\frac{1}{4}$ , and \$500 is  $\frac{1}{8}$  of the whole estate. Ans. The share of a son was \$2500

156. Take  $\frac{1}{3}$  of the whole for the wife, and  $\frac{1}{3}$  for the son. Then, of the other  $\frac{1}{3}$ , the daughter has 3 parts, and the wife 1 part, that is, the daughter has  $\frac{3}{4}$  of  $\frac{1}{3} = \frac{1}{4}$  of the whole. The son had  $\frac{1}{3}$ . The difference is  $\frac{1}{12}$ . Therefore \$1000 is  $\frac{1}{12}$  of the whole. Ans. The wife had \$5000; the son \$4000; and the daughter \$3000

157. If he had bought 3 less for the same money, the price of each orange would have been once and one half as

much ; consequently, if he had bought the same number at the latter price, they would have come to  $37\frac{1}{2}$  cents. Three oranges then would have come to  $12\frac{1}{2}$  cents. Hence 3 oranges must have been  $\frac{1}{3}$  of the number that he bought. Ans. He bought 9 oranges, at  $2\frac{1}{3}$  cents each

158. Say the first had 6 parts, the second 4 parts, and the third 3 parts. The first had  $\frac{6}{13}$ , the second  $\frac{4}{13}$ , and the third  $\frac{3}{13}$ . The second and third together had  $\frac{7}{13}$  of the whole. \$1500 is  $\frac{7}{13}$  of the whole, which is \$2785.71 $\frac{1}{2}$ . Ans. The first had \$1285.71 $\frac{1}{2}$ , the second \$857.14 $\frac{1}{2}$ ; and the third \$642.85 $\frac{1}{2}$

159. Double the second condition, and say, he had 16 bushels of corn and 20 of rye for \$30; and 48 bushels of corn and 20 of rye for \$54. The difference between \$30 and \$54 (which is \$24) must be the price of 32 bushels of corn, which is \$0.75 per bushel. Ans. Corn \$0.75, and rye \$0.90 per bushel

160. He had travelled 42 parts of the distance, and had 25 parts to travel ; that is, he had travelled  $\frac{4}{7}$  of the distance, which is 210 miles. Ans. 30 miles per day

161. The second had as much as the first, and  $\frac{1}{3}$  as much as the third. Taking the last conditions, the second had 1 part, while the third had 3 parts. The third had as much as the other two ; the first part of the second balances one part of the third ; then of the other 2 parts, one will balance what the first had, and the other the part which the second had, that was equal to the first. Therefore the first had 1 part, the second 2 parts, and third 3 parts ; that is,  $\frac{1}{6}$ ,  $\frac{2}{6}$ , and  $\frac{3}{6}$ . \$2000 is  $\frac{1}{6}$  of the whole. Ans. The second had \$4000, and the third \$6000

162. When they were married, her age was 1 to his 3 ; after 15 years, hers is 2 to his 4. It appears that her age was doubled, and his had become  $\frac{4}{3}$  of what it was. Hence

her age was 15, and his was 3 times 15 or 45 years when they were married. Ans. Man 45, and wife 15 years

163. \$1.35 per gall.

164. A had gained a sum equal to  $\frac{1}{4}$  of his stock ; he had then  $\frac{5}{4}$  of it. B had only  $\frac{1}{2}$  as much, that is  $\frac{5}{8}$  of his stock, consequently \$225, which he had lost, was  $\frac{3}{8}$  of his stock. Ans. \$600 each

165. If to  $\frac{1}{2}$  the body, 16 inches be added, it makes the length of the tail ; if to this 16 inches more be added, it makes the body, that is,  $\frac{1}{2}$  the body and 32 inches make the whole body. The body then is 64 inches, and the whole 128 inches. Ans. 128 inches

166. If to  $\frac{2}{3}$  of the age of C 20 be added, it makes the age of B ; if to this 20 be added again, it makes the age of C ; that is, 40 and  $\frac{1}{3}$  of itself makes the age of C ; 40 then is the other  $\frac{2}{3}$ . 40 is  $\frac{2}{3}$  of 56. Ans. B 36, and C 56 years

167. If the second be covered, it will weigh three times the first, that is 36 oz. The cover and the second cup together therefore weigh 36 oz. If the first cup be covered, it will weigh twice as much as the second ; therefore if both the cups and the cover be taken together, the first cup and the cover will be  $\frac{2}{3}$ , and the second  $\frac{1}{3}$  of it. The whole together weigh 48 oz. ;  $\frac{1}{3}$  of this is 16 oz. ; this is the weight of the second cup, consequently the cover must weigh 20 oz. Ans. Cover 20 oz. and second cup 16 oz.

168. The first and second do  $\frac{7}{8}$  of it, consequently the third does the other  $\frac{1}{8}$  of it. The second and third do  $\frac{7}{11}$  of it, consequently the first does  $\frac{4}{11}$ .  $\frac{4}{11}$  and  $\frac{7}{11}$  are  $\frac{11}{11}$ . The first and third together do  $\frac{11}{8}$  of it, consequently the second does the other  $\frac{7}{8}$ . Ans.  $\frac{4}{11}$

169. The apples cost  $\frac{2}{3}$  of a cent each. There were 8 apples to 5 pears. 8 apples cost  $\frac{16}{3} = 5\frac{1}{3}$  cents, and 5 pears cost the same ; therefore 8 apples and 5 pears cost  $\frac{16}{3}$  of a cent, which will average  $\frac{8}{3}$  of a cent apiece. He gained  $\frac{1}{3}$

on each, consequently he gained 19 cents on 39.  $\frac{2}{13}$  of these were apples, which is 24; this is half what he bought. Ans. He bought 48, and gave 20 cents for them

170. In going once round the dial plate, the minute hand gains 55 minutes or spaces; consequently it would take it  $\frac{60}{55} = 1\frac{1}{11}$  minute to gain 1 minute or space, and to gain 35 it would take 35 times as long, that is,  $38\frac{2}{11}$  min. Ans. 7 h.  $38\frac{2}{11}$  min.

171. This is to divide 12 into 2 parts, in the proportion of 5 and 17. The first part will be  $\frac{5}{22}$  of 12. Ans. 2 h. 43 min.  $38\frac{2}{11}$  sec.

172. Reducing the fractions to a common denominator  $\frac{27}{83}$  of the time past is equal to  $\frac{14}{43}$  of the time to come, or the time past equal to  $\frac{14}{43}$  of the time to come.  $\frac{14}{43}$  of 12 hours will be the time. Ans. 4h. 5 min.  $51\frac{9}{43}$  sec.

173. He sold  $\frac{1}{4}$  of his linen and  $\frac{1}{5}$  of his cotton for \$12, by which he gained \$0.60. Hence this quantity cost him \$11.40. Multiplying this condition by 4, all his linen and  $\frac{4}{5}$  of his cotton must have cost him \$45.60. Subtracting this from \$50, the price of the whole, there remains \$4.40 for the price of  $\frac{1}{5}$  of the cotton. The cotton cost \$22; consequently the linen cost \$28; 5 times 22 are 110, the number of yards of the cotton; 3 times 28 are 84, the number of yards of linen. Ans. 110 yds. of cotton, and 84 yds. of linen.

174. A's share is  $\frac{2}{3}$  of B's, and C's share is  $\frac{1}{4}$  of B's. The difference between  $\frac{2}{3}$  and  $\frac{1}{4}$  is  $\frac{5}{12}$ , therefore the difference between the shares of A and C is  $\frac{5}{12}$  of B's share; hence \$7500 is  $\frac{5}{12}$  of B's share.

Ans. A's share is \$11666 $\frac{2}{3}$ , B's \$7291 $\frac{1}{3}$  and C's \$4166 $\frac{2}{3}$

175. Beginning at the end of the 3d year, subtract \$150 from \$14811 $\frac{7}{8}$ , and the remainder \$14661 $\frac{7}{8}$  is  $\frac{1}{4}$  of what it was at the beginning of the year, that is, \$11729 $\frac{1}{4}$ . From this subtract \$150 again, and the remainder will be  $\frac{1}{4}$  of what it was at the beginning of the first year; that is

\$9263 $\frac{1}{4}$ . From this subtract \$150, and the remainder is  $\frac{1}{4}$  of his first stock. Ans. \$7290 $\frac{1}{4}$

176. While the grey-hound takes 3 leaps the hare takes 4, therefore while the grey-hound takes 1 leap the hare takes  $1\frac{1}{3}$ , and while the grey-hound takes 2 leaps the hare will take  $2\frac{2}{3}$  leaps; but the grey-hound leaps as far at 2 leaps as the hare does at 3, therefore in taking 2 leaps he gains  $\frac{1}{3}$  of one of the hare's leaps, that is,  $\frac{1}{3}$  at each leap; hence he will overtake her at 6 times 50 or 300 leaps. Ans. 300 leaps

177. If he had worked the whole time, he would have received \$90, but he lost \$15 out of this. Now the difference between working and being idle was \$2 a day. Hence he was idle  $7\frac{1}{2}$  days. Ans.  $52\frac{1}{2}$  days

178. In 8 years he gets £40 in debt, that is, £5 a year; therefore he spends £5 more than his income. A spends  $\frac{4}{5}$  of his, and B spends £5 more than  $\frac{4}{5}$ . Hence £25 must be  $\frac{1}{5}$  of his income. Ans. £125

179. Spouting from his throat he would fill at the rate of  $\frac{1}{3}$  of the cistern in an hour, from his right eye he would fill  $\frac{1}{4}$  of it in an hour, from his left eye he would fill  $\frac{1}{5}$  of it in an hour, from his right foot he would fill  $\frac{1}{6}$  of it in an hour. All these together make  $\frac{5}{12}$ ; hence, all spouting together, he would fill  $\frac{5}{12}$  of it in an hour; 65 is contained in 144  $2\frac{1}{4}$  times. Ans. 2 h. 12 min. 55 $\frac{1}{3}$  sec.

180. After the fourth game, twice his money was as much less than 200s. as three times his money was greater than 200s.; hence 200s. was  $2\frac{1}{2}$  or  $\frac{5}{2}$  his money. 200 is  $\frac{5}{2}$  of 80, to that add 20, and it will make what he had at the end of the third game.  $80 + 20 = 100$ ;  $\frac{1}{2}$  of 100 or 50 is what he had after the second game.  $50 + 10 = 60$  is what he had after the first game, and  $\frac{1}{2}$  of 60 or 30 is what he commenced with. Ans. 30s.

181. 15.708ft.

182. 5.41ft.

- 183—187. See book  
188. 24855.412 miles  
189. 1035.6 miles  
190. 69.043 miles  
191. 15 degrees  
192. 15 min. of a degree  
193. 1 h. 34 min. 52 sec.  
194. 4 h. 27 min. 16 sec.  
195. 0 h. 36 min. 28 sec. even.  
196. 68093 miles nearly  
197. 1433.8 miles. Lat. of Boston  $42^{\circ} 23'$   
198. 2487.45 miles  
199. \$61.035  
200. £34 12s.  
201. \$160.03  
202. 1532 francs,  $90\frac{2}{3}$  centimes  
203. \$209.20  
204. 246  $\frac{1}{10}$  gelders.  
205. \$301

**THE END.**













